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By H. R. McCRIMMON, Ph. D.
DEPARTMENT OF LANDS AND FORESTS

ON. CLARE E. MAPLEDORAM
MINISTER

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INTRODUCTION

The purpose of this paper is an outline of the history of the Lake Simcoe fishery from the days of earliest exploration and settlement until the present time. It is felt that the story of the tremendous changes in the fishery which accompanied the settlement and development around the lake may contribute towards a better biological understanding of the fishery and may be of interest to fishermen, historians, and all others concerned with the effect of civilization on the natural resources of this country.

Although authentic information on the early fishery is scarce there are dispersed through the records of the travellers and settlers infrequent references to the game and commercial fisheries as practised by the native Indians and by the white men who followed them. These references date back to 1815. Commencing with the first annual Dominion fisheries report in 1868, statistical records of the Lake Simcoe fishery become available which have greatly assisted in the interpretation of the trend of the fishery.

The account of the fishery during the present century has been greatly strengthened by an analysis of rather extensive material gathered through interviews with many reputable fishermen and others with long-standing experience on the lake. A comprehensive biological research on the bottom fauna of the lake, carried out by Dr. D. S. Rawson between the years 1925 and 1927, has contributed detailed information on the productivity of the lake in terms of the lower forms of aquatic life which has been of value to the author in the present account of the fish and fisheries of Lake Simcoe. The present study was initiated in 1949.

Since the earliest times, Lake Simcoe has been a medley of commercial fishing and game fishing which is further complicated by the unusual fishing methods employed in the lake. The introductions of several species of fish to the waters of the lake are, in themselves, of considerable interest.



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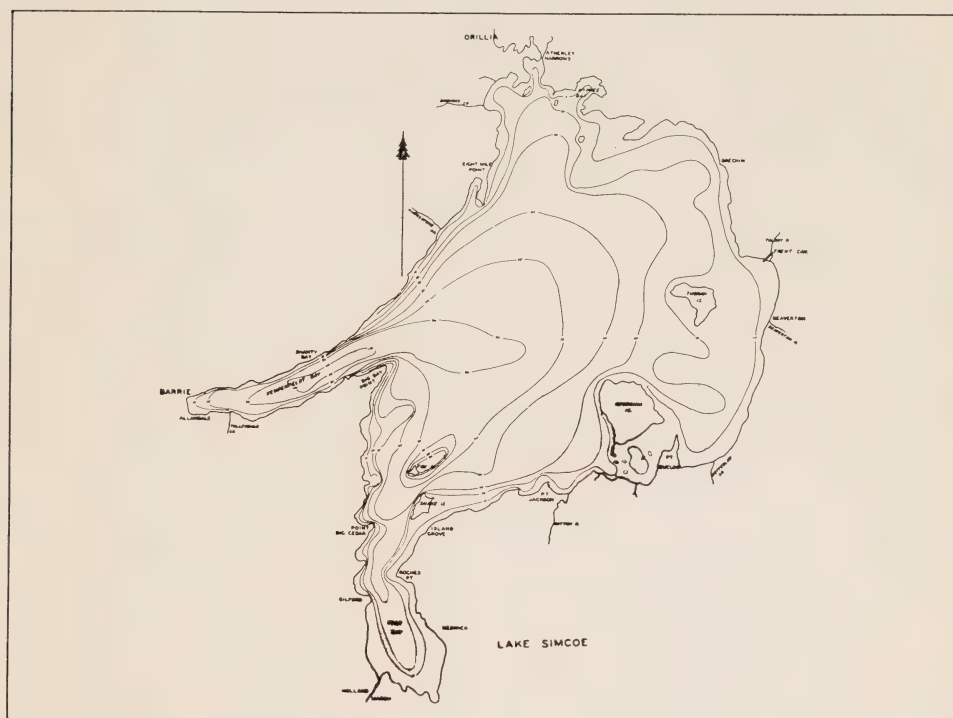
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DESCRIPTION OF THE LAKE



Lake Simcoe is the fourth largest of the inland lakes of Ontario and is located in that strip of southern Ontario lying between Lake Ontario and Georgian Bay at an elevation of 720 feet above sea level. Geographically, it is situated at Latitude 44°N, Longitude 79°W. The water drains north and west through the Severn river system to Georgian Bay and the Great Lakes.

The lake has an area of 280 square miles but a rather short and generally exposed shoreline of only 144 miles, including that of the few islands. The average depth of the lake has been calculated at 56 feet. The maximum recorded depth is 145 feet, with some 6 per cent of the lake over 90 feet deep (Rawson, 1930). The deep part of the lake is in the north and west portions where the descent from shore into deep water is rapid, in contrast with the gradual declination in the eastern and southern section where shallow areas are found.

The main body of the lake, as shown in Figure 1, is somewhat oval in shape with two long bays, Kempenfeldt Bay on the west, and Cook's bay on the southwest. The only islands of any size are at the south, Fox and Snake islands,

at the north Strawberry, Grape, and Whitney islands, and on the east side of the lake the larger Thorah and Georgina islands. At the south end of Cook's Bay lies the extensive Holland Marsh, which *Smith's Canada* terms "an extensive nursery for ducks, frogs, and mosquitos."

Lake Simcoe and about 35 tributary rivers and streams drain a watershed of about 1200 square miles. The larger tributaries are shown on the map of Lake Simcoe, the more important of which are the Holland river entering Cook's bay through the Holland marsh, the Jersey river near Keswick, the Black river near Jackson's Point, the Beaver river at Beaverton, the Talbot river at Gamebridge, Brough's Creek, near Orillia, Hawkestone Creek at Hawkestone, and a number of smaller creeks particularly in the vicinity of Barrie on Kempenfeldt Bay.

Lake Simcoe forms a part of the Trent Canal system which joins eastern Lake Ontario with Georgian Bay by linking the Kawartha lakes system with Lake Couchiching and the Severn River. The canal joins with the Talbot River to enter Lake Simcoe at Gamebridge. As the natural height of land separating Lake Simcoe from the Kawartha Lakes' watershed lies only some 5 miles north, the area of land draining into Lake Simcoe through the canal is relatively small. The series of canal locks and particularly a lift-lock at Kirkfield prohibit any significant movement of fish or interchange of water through this waterway.

In contrast, the outlet of Lake Simcoe through the Narrows at Atherley allows a free movement of boats or fish into or out of Lake Couchiching. The outflow of the water from Lake Simcoe through the Narrows approximates 600 cubic feet per second at low water level.

Although geologically the lake lies almost entirely in the Trenton formation, the underlying limestone has been completely covered by clays of glacial origin (Coleman, 1922). The shoreline of the lake is about 55 per cent stony, 35 per cent sandy, leaving the remaining 10 per cent capable of supporting vegetation. The extent of unprotected shoreline increases the importance of wave action in determining its character and results in extreme variation from bare sand beaches to rich muddy bays. Although practically the entire shoreline excluding the bays is exposed, the eastern and southern shores are subjected to the most extensive wave action. In the spring, the action of the wind causes great ice sheets to scour the shoreline and denude it of vegetation. In the shallow water areas, hardclay and marl bottom occur. The extent of stone, sand, and mud on the bottom of the deeper part of the lake is relatively uniform in character, being covered by varying depths of oozy mud. The lake is fairly rich in the amount of bottom fauna and plankton available for fish production.

The water of Lake Simcoe is very clear and generally well oxygenated at all depths at all seasons of the year. The slight alkalivity of the water is caused in part by the limestone and marly clays in the watershed.

EARLY EXPLORATION AND SETTLEMENT

In order that the reader may become somewhat familiar with the exploration and settlement around the lake shore which was to have its influence on the Lake Simcoe fishery, a brief account of some of the more important historic events relating to Lake Simcoe will be given. The history may be separated more-or-less into the period of French exploration and that of English settlement.

THE FRENCH PERIOD

On the 17th day of August, 1615, the Huron Indians led Champlain to *Cahiagué* near the north end of Lake Simcoe where he reported that his arrival was received with great delight and thankfulness by the savages. In his description of the vicinity he noted the "Narrows", known as *Michekum* (fence) by the Ojibways and *Tarontaen* by the Hurons, where "the great catch of fish is made by means of a great many stakes, which almost close the strait, leaving only little openings where they set their nets in which the fish are caught". The remains of this weir were apparently re-discovered by Wallace in 1891.

It would seem that this peculiar fishing device described by Champlain caused Lake Simcoe to become known to the early French as *Lac aux Claiés* (lake of the stakes) and subsequently corrupted to *Le Clie* which remained its name for many years. It was originally known to the Hurons as *Ouentaron* (beautiful lake), by the Ojibways as *Ashuniong*, *Sheniong*, or *Tepanignon* and by the Algonquins as *Wahweyagahmah* (round lake). In Champlain's map of 1632, the lake is shown but given no name. On a map accompanying Sagard's letters of about 1624, Lake Simcoe was called lake Toronto, and the Indians inhabiting its shores were called *Toronotogueronons*. This same nomenclature appears on Moll's large map of 1720. A map showing the Jesuit missions of 1649 designates this water as lake *Veritasni*, a name not found elsewhere. A map by Sanson in 1656 still calls it by the Huron *Oentaron*, while that of Du Creux names it *Lacus Ouentaronius*.

The importance of Lake Simcoe as an early water route was illustrated by Brulé who, on leaving Champlain at *Cahiagué* in 1615, made his way southward across the lake by boat to the Holland River which he ascended some distance. He then crossed by an Indian trail to Lake Ontario. It is at this point that this route linking Lake Simcoe and Lake Ontario comes into recorded history. For many years the important portage linking the west branch of the Holland River with *Teiaigon* on Lake Ontario at the mouth of the Humber River became known as "*Le Passage de Toronto*" or "*The Toronto Carrying-Place*". The Jesuits would, no doubt, have used this land and water route to the Country of the Hurons had they not feared the Iroquois who controlled the "no-man's land" to the south of Lake Simcoe by their frequent incursions. At any rate, this route was later designed to play an important part in the early settlement

of the shores of Lake Simcoe. The Huron population in 1653, as recorded by Brebeuf, included 20 villages and 30,000 souls who were incessantly harassed by hostile Iroquois tribes.

Following the massacre of the Huron population by the Iroquois in 1649-50, a long silence fell over Lake Simcoe and its environs although several French explorers, including LaSalle and Joliet, reached its shores. In 1687, Lahontan made mention of Iroquois hunting and fishing trips to the vicinity of Lake Simcoe which appeared on the maps for a century after the expulsion of the Hurons as "the beaver hunting grounds of the Iroquois". During this period the Algonquins were known to encamp along its northern and western shores while the Ojibway subsequently occupied the Lake Simcoe district where they showed considerable talent as fishermen.

As the future settlement of the Lake Simcoe district was to come from the south, a notable event was the strategic founding of Fort Rouillé, later Fort Toronto, as a French trading-post in 1749-54. It was located on Lake Ontario directly south of Lake Simcoe near the south end of what became the Lake Simcoe-Fort Rouillé path.

THE ENGLISH PERIOD

In 1760, Major Rogers of the English visited Fort Toronto which had been evacuated previously by the French and recommended the establishment of a factory (trading-post) at that location, which became known as York and later as Toronto. Colonization of the land to the south of Lake Simcoe had begun in 1669-70 with the first recorded residence of a white man in the vicinity of Toronto. However, it was not until after the Constitution Act of 1791 and the moving of the capital of Upper Canada to Toronto in 1793 that colonization advanced appreciably towards the shores of Lake Simcoe. The first English-speaking traveller reported to have passed through the lake was Alexander Henry who was a captive of the Indians at Sault Ste. Marie and accompanied them to Niagara in 1764.

In 1791, Major Holland made survey trips in the vicinity of Lake Simcoe. By 1793 when Simcoe, then the first Lieutenant-Governor of Upper Canada, made a passage through the lake, settlers had reached the land lying around the old "Toronto Carrying-Place" and, by 1796, a cart-road extended from the harbour of York to the Pine Fort at the Holland Landing. The construction of a road, known through its whole length as Yonge Street in honour of a former minister of war, greatly assisted in the settlement around Lake Simcoe. Although this direct route from York to Holland Landing was improved during the war of 1812 for the transportation of military stores, it remained poor at certain seasons of the year until 1835.

Considerable interest was developing towards Lake Simcoe by 1800 as attested by action to name or re-name a number of important landmarks. Lake Simcoe was named by Governor Simcoe in memory of his father, Capt. Simcoe, R.N., who died on an expedition to Quebec in 1759. Cook's Bay was given the name of the great circumnavigator. Kempenfeldt Bay recalled the name of a navigator who went down on the *Royal George* "with twice four hundred men".

The Holland River, named after the Surveyor-General, was known earlier by the white man as Mississaga Creek from the Indian *Miciaguean*. It was still earlier named "Excoyondy" by the Chippewas. At this early date, Georgina Island was called Graves Island, Thorah Island was named Canise Island after the Indian who held Governor Simcoe's son in his arms during the "firing" when York was named, and an unsuccessful attempt was made to change Snake Island to Darlington Island although it had been known by the former name since the time of the earliest traders. The Pine Fort at the Holland Landing was renamed Gwillimbury.

On May 22, 1798, the Government made its first purchase of land from the Indians around Lake Simcoe. By 1802, Quetton St. George had established a trading-post at the Narrows near the present town of Orillia for the purpose of bartering with the Indians. During the period of 1794-1820, most of the land grants around the upper part of the Holland River had been taken up. Dutch immigrants reached as far north as East Gwillimbury Township at the south of Cook's bay prior to 1810.

With the Indian surrender of all territory around Lake Simcoe to the Government in 1818, the way was left open for settlement and no time was lost in staking out the land into townships. Indian reservations were established on Snake, Georgina Islands and in Rama Township. Settlement was assisted greatly by the immigration of many half-pay military officers during the years 1820-1835 following the close of the Napoleonic wars. This first settlement near Lake Simcoe in East Gwillimbury was followed by the residence of a settler in West Gwillimbury in 1819. The earliest settlement in the remaining townships around the lake was between 1820 and 1830, excepting Rama which apparently did not receive permanent settlers until a number of British officers arrived in 1835. Many of these settlers reached their destination in the wilderness by crossing Lake Simcoe by boat. While only one schooner handled the traffic on the lake in 1816, several schooners were required to transport the settlers and their belongings in the following years.

During the year 1831, the construction of the first of a series of steam-boats for Lake Simcoe was begun. This boat was called "The Sir John Colborne" and later renamed "The Simcoe" in 1839. The "Peter Robinson" was launched at Holland Landing in 1833. A number of boats followed in succession including "The Beaver", "The Morning", "The J. C. Morrison", "The Emily May", "The Lady of the Lakes", "The Orillia" and several more. In 1827, the Trent Canal system was first discussed with the result that the work was started in 1833, but not completed until 1907. On May 16, 1853, the first railway locomotive in Canada West left Toronto and travelled northward nearly to the Holland Landing where the trip was completed by stage coach. By later in the year, the railway reached Bradford and soon pushed northward to Barrie.

After this time, progress was rapid as towns, villages, and hamlets grew up around the lakeshore. Although there had been an occasional camper spending vacations around the lake before 1888, the recreational value of the lake was not actively utilized by other than the local people at that time. In 1873, a summer hotel accommodating 300 guests was built on Couchiching Point, at the north end of the lake, but burned down some three years later. From this time on,

retired people began to set up homes in the vicinity of Orillia, and presumably elsewhere on the lakeshore. In 1898, an effort was made on the part of the Town of Orillia to develop the tourist trade through extensive publicity in the United States. This included the sending of samples of large bass to several American cities as advertisement.

Gradually the shores of the lake became lined with summer cottages until, at the present time, lakeshore frontages are difficult to obtain. The east shore, which was serviced from Toronto by an electric trolley or "radial" for many years, has been the most extensively developed with clusters of cottages located even at considerable distances from the water.

The proximity of Lake Simcoe to Toronto and other heavily populated urban areas allows an extensive influx of transient fishermen from these places during all seasons of the year. This magnifies the fishing pressure of cottagers, vacationers, and local residents on the fish production of the lake.

THE FISHERY

EARLY RECORDS 1615-1867

The records of the French explorers who travelled on Lake Simcoe are peculiarly lacking in references to the fishery of the lake during the time of the Huron Indians. A notable reference was made by Champlain in 1615 when he described the weir of stakes with which the Hurons captured large quantities of fish in the "Narrows" at the north end of the lake.

While visiting among the Hurons in 1624 and 1625, Sagard noted that the Hurons caught the great fish called the *Assihendo* and "sometimes put aside the biggest and fattest *Assihendos* and set them to boil in great kettles in order to get the oil from them" which they put in bottles and which was "as sweet and nice as butter". He described the *Assihendo* as a "fish as big as the largest cod, but much better". This fish was probably the sturgeon, although possibly the whitefish.

Superstitions were apparently closely associated with the Huron fishing practices for Sagard related that the Hurons, with whom he was living, warned him not to throw any fish bones on the fire as the spirits of the fish themselves would be harmed and would advise the other fish in the lake to avoid being captured.

A very important member of each Huron fishing party was the "fish preacher" whose sermons had the power of attracting fish into the nets. It would seem that the Hurons believed in a spirit with great power over their fishing success for one legend told that the "Spirit of the Nets" had once appeared in human form and complained of having lost his wife. He warned that unless the Indians could find him a replacement they would catch no fish. Therefore, in order to assure a good catch the Hurons gained the favour of this spirit at the beginning of every fishing season by ceremoniously offering him two Huron maids as wives. There is no doubt that fish formed an essential part of the diet of the Hurons.

Unfortunately, the early records of the Jesuits ended abruptly with the annihilation of the Hurons by the Iroquois in the mid-17th century. It was not until nearly 200 years later that descriptions of the Lake Simcoe fishery were made. The writings were then in English rather than French and the authors were usually settlers or visitors from the British Isles.

Conditions about the lake were also different for the Ojibway Indians had replaced the vanquished Hurons on the lakeshore. One of the earliest references to the fishery of Lake Simcoe written in English is that made by Governor Simcoe in about 1792 in which he stated that "we hear of maskalonge (a superior kind of pike) . . . in abundance in Lake Simcoe". During a trip through the lake several years later, he reported that the larger trout of the lake were not so good as the smaller trout.

A most interesting account of the method of ice fishing as practised by the Indians appeared in the diary of George Bond under the date, March 6th, 1815. In this description of his first contact with the winter fishery, Bond recorded that while skating on the ice "there appeared on the ice what appeared to be a mound of ice thrown up . . . as I approached within a few hundred yards, I thought I perceived it move a little . . . it was a light-brown colour; but the figure was so indistinct that while I watched it intently I could not decide what it could possibly be . . . I stood for some seconds thinking what I should do, and had almost determined to go home for my gun, when I saw the hide which caused all my speculation thrown suddenly aside to make way for the head and shoulders of an Indian, who protruded his rough matted locks into daylight from under it . . . He had so completely enveloped himself in a large buffalo skin that no part of his body, head, hands, or feet were to be discovered. He sat over a square hole cut in the ice, with a short spear ready to transfix any fish which might be attracted by his bait. The hole was about a foot square, and the bait was an artificial fish of white wood, with leaden eyes and tin fins, and about 8 or 9 inches long. The ice where he had cut it was about three feet thick".

During the spring of 1815, Bond related that he saw a canoe paddled by a couple of Indians advancing along the shore. As they had several large salmon (lake trout) in the boat, Bond obtained one of these fish in exchange for a drink of liquor which made the Indian's eyes "begin to role in his head". Before leaving this Indian, he was able to purchase the bark canoe and a 15-foot spear for the sum of nine dollars. He was then ready to try his own ability at this way of fishing.

The story which Bond told of his first night fish-spearing expedition described rather well the fishing equipment employed and the fish seen. He stated that "the fish-spear consisted of a straight handle about fifteen feet long, to which a couple of barbed iron spikes, of sufficient size to pierce a moderate-salmon were affixed. The birch-bark, for the purpose was prepared in pieces three or four double, each the size of a large quarto book; and one at a time of these was stuck in a cleft pole five or six feet long, placed at the head of the canoe, overhanging the water in such a manner that the blazing bark might shine upon it. The canoe was a very egg-shell, cranky as a washing-tub, and more fitted to carrying ghosts than men". During this night they ran into groups of Indians pursuing the same occupation.

Although unable to spear a lake trout on this trip, Bond observed and speared several kinds of fish. He stated that "we passed some perch lying close to the bottom, and soon afterwards a rapid quiver of water announced the presence of some larger fish. It was a sucking carp (sucker); a worthless prize full of bones, and very watery".

Further references to Lake Simcoe by this author included a description of a trip with an Indian family in a canoe which was paddled by the squaw sitting in the stern. Her husband stood up in the bow looking for fish, and, on spearing one, would turn the spear towards the squaw in order that she might extricate the captured fish. At a later time, he came across "two very pretty damsels busily employed broiling fish over a fire which they had made on the margin of the bay. A fish spear was lying in the canoe, also a large salmon trout,

which had apparently just been taken". Later he saw lying on the bottom "a hideous-looking fish, yellow with black spots, the body like that of a snake, with a large head a foot and a half long . . . I speared him and found him so strong that I verily expected he would have broken the handle of the spear. He was what the Canadians call a cat-fish . . . He was, of course, not eatable". He very vaguely described several other species of fish but concluded that "the fish here are like all their freshwater brethren, of inferior quality".

Although occasional allusions were made to the fine fishing in Lake Simcoe, few authentic reports of the early fishery are available. In Smith's *Canadian Gazetteer* of 1846 there was testimony to the excellence of the Lake Simcoe maskinonge and whitefish. Elsewhere the bass fishery was highly praised. The Canadian Handbook and Tourists' Guide of 1866 stated that the Indians thought more of a few fish hooks than they did of money when selling the maple syrup which they had on hand through most of the summer. Concerning the night spearing during this period, this book stated that spearing from a canoe was a romantic and exciting sport. The light for this endeavour was produced by the "iron jack" in the bow of the boat which was fed with pine knots, familiarly called "fat pine", or with birch bark. The white men soon adopted the spearing practices of the Indians and apparently became quite proficient in the art.

By the middle of the 19th century, a considerable fishery had developed on Lake Simcoe which extended over the four seasons of the year. While those methods of spearing, netting, and setting nightlines which the early settlers learned from the native Indians comprised the bulk of the fishery, it is interesting to note that even at this early date angling with hook and line had begun to occupy more and more of the leisure hours of both the residents and others who came considerable distances to enjoy the pastime of still fishing or trolling.

As the same species of fish were prized by both the commercial and sport fishermen, it was not many years until many sport fishermen became disturbed over the heavy and unlimited exploitation of the more desirable species of fish. Their demands resulted in the enactment of numerous fisheries regulations after 1885 which have effectively separated the fishery into two parts, a commercial fishery and a sports fishery. A general consideration of the history of each of these fisheries follows.

THE COMMERCIAL FISHERY

The early fishery of Lake Simcoe was essentially a commercial one. It has been established that the Indians who inhabited the shores of the lake were excellent fishermen and captured large quantities of fish which constituted an important item of food among their peoples. The fish were eaten fresh, or salted away for future consumption. After the arrival of the white man, there are numerous references to the trading of knives, guns, ammunition, and a variety of other articles for the fish which the Indians caught.

As time went on, the settlers gradually adopted those fishing methods which were so successfully practised by the Ojibway Indians. By the middle of the nineteenth century, we find that the white men did considerable netting and spearing of fish in the spring and fall, and carried out quite extensive winter fishery through the ice. Although the primary purpose of most of the fishing at that time

was the procurement of necessary food, undoubtedly it was considered excellent sport by many of the fishermen. Angling with hook and line, particularly for bass, also increased in popularity during the summer months.

The commercial fishery of Lake Simcoe has undergone many changes since the middle of the last century. Although at first there were no restrictions on the method of fishing or on the sale of fish, the trend in fisheries legislation passed over the past 70 years has been towards a curtailment of the commercial fishery in favour of a sport fishery. The result has been that the present commercial fishery is a very restricted one. Only coarse fish and minnows now may be taken for sale under a commercial seine-net or dip-net licence. Whitefish and freshwater herring taken by angling may be sold without the authority of a licence. The extent to which the latter fishery is practised is more-or-less peculiar to Lake Simcoe among Ontario waters.

The following account of the commercial fishery will show that the general trend exhibited by the fishery has been primarily the result of extensive fishery legislation rather than the effects of fluctuations in fish populations which, with the exception of the carp accidentally introduced about the turn of the century, must be considered only secondary in importance.

The first legislation which affected the commercial fishery of Lake Simcoe was an Act passed in 1840 concerning the inspection of fish. Fish inspectors were appointed and the charge for their work was set at six-pence per barrel, and four-pence per half-barrel of fish inspected. It was the duty of the inspector to see that each barrel contained 200 pounds of fish of the required quality.

It was not until 1868 that an annual fishing return was required. The first report for Lake Simcoe, appearing in the annual report of the Department of Marine and Fisheries of the same year, totalled some 61,100 pounds of fish, including whitefish, lake trout, freshwater herring, maskinonge, bass and a few coarse fish. The value of this catch was reported at \$1,910.00.

Table I tabulates the reported catch of fish by species for each decade between 1868 and 1952 during which period a commercial catch of 11,133,625 pounds of fish valued at \$573,103 was reported. The poundage of the commercial fish reported annually for Lake Simcoe since the inception of annual returns are given graphically in Figure 2.

In considering these commercial returns, it must be recognized that they constitute an unknown percentage of the actual number of pounds of fish taken for sale purposes. For example, the annual report of 1886 stated that "trolling with hook prevents accurate statistics". This was particularly true in the earlier days of the fishery when there were few restrictions on fishing gear, or on the sale of fish, and large quantities were sold or bartered locally. This condition still prevails for Lake Simcoe whitefish and herring which are caught by angling and, not being a game fish, are sold legally in the vicinity of the lake. However, the annual commercial returns represents quite accurately the trend of the fishery and constitute an important contribution towards an understanding of its history.

As this discussion of the commercial fishery of Lake Simcoe is concerned only with a general account of the fishery during the past 85 years, detailed

TABLE I

COMMERCIAL FISHING RETURNS REPORTED FOR LAKE SIMCOE, 1868-1952

SPECIES	1868-69	1870-79	1880-89	1890-99	1900-09	1910-19	1920-29	1930-39	1940-49	1950-52	TOTAL
Herring.....	4,000	62,250	147,500	83,020	28,640	11,211	4,501	10,265	135	0	351,522
Whitefish.....	11,600	214,040	290,300	184,750	174,550	71,266	58,014	92,881	5,074	0	1,102,275
Lake trout.....	12,100	408,400	384,500	384,005	40,815	73,427	199,469	215,528	24,870	0	1,717,114
Pickarel.....	0	1,000	38,000	178,900	20,200	12,991	1,100	0	0	0	252,191
Bass.....	64,600*	35,600	175,000	412,400	104,200	0	0	0	0	0	791,800
Pike.....	*	12,400	194,000	176,000	0	0	0	0	0	0	382,400
Maskinonge.....	25,000	20,600	72,350	113,100	23,000	0	0	0	0	0	254,050
Sturgeon.....	0	0	34,000	103,500	0	0	0	0	0	0	137,500
Perch.....	0	0	0	32,500	145	97,092	32,770	29,959	0	0	192,466
Catfish.....	0	0	0	26,950	6,390	1,253	10,446	4,295	4,200	0	53,534
Coarsefish.....	200	0	45,000	272,650	30,727	349,307	515,266	470,650	27,889	0	1,711,689
Carp.....	0	0	0	0	0	1,607,406	1,819,927	523,712	236,039	1,000	4,188,084
Total Pounds.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11,134,625
Value.....	\$ 3,850	\$ 33,935	\$ 87,115	\$ 123,139	\$ 19,965	\$ 85,171	\$130,421	\$ 19,859	\$ 19,859	\$100	\$ 523,414

*Pike and bass mixed.

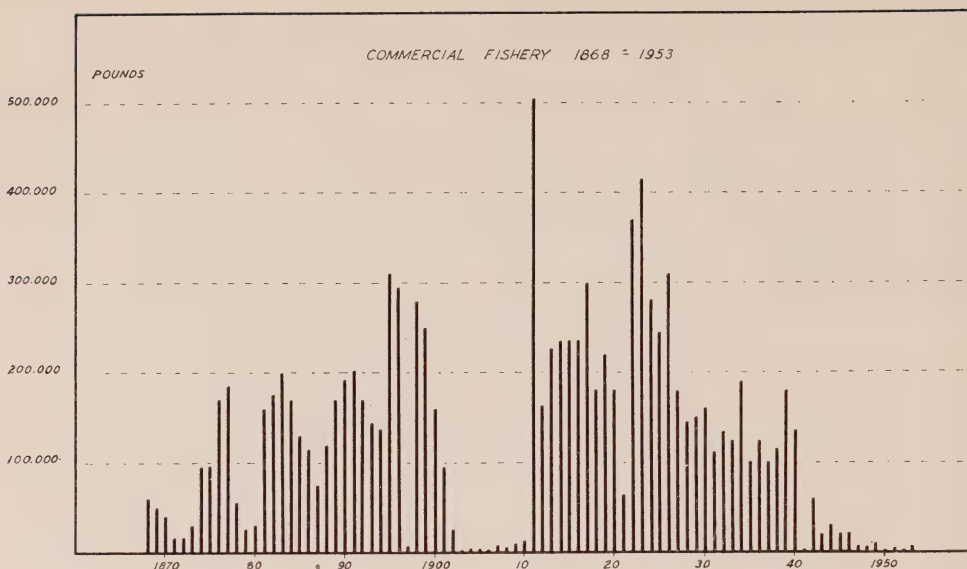


Figure 2—The Lake Simcoe commercial fishery.

description of the fishery for each species will be reserved until a later section. However, those factors, mostly legislative in nature, which significantly modified the course of the fishery from time to time will now be outlined.

Following the establishment of the Ontario Fisheries Act in 1885, a considerable number of fisheries regulations were passed in the years that followed. These regulations were generally aimed at the protection of the game fish through a control over methods of capture, closed seasons, and limits on the size and number of fish which might be taken. By 1890, net fishing was no longer allowed in Lake Simcoe as the lake had been "set aside for natural propagation". Until that time, gill net fishing for lake trout, whitefish, and freshwater herring had been practised during the spring and fall months. In 1880, for example, there were nine licences issued covering some 25,850 yards of gill net. The greatest yardage of gill net licensed was in 1881 when 13 fishermen used 33,000 yards of net. The illegal use of gill nets, particularly in the autumn, became quite extensive after this time and, although poaching by this means has declined rapidly in recent years, it is most probable that lake trout and whitefish are still taken on the spawning beds by this method. In spite of the abolition of legalized net fishing in Lake Simcoe the commercial catch continued to rise to a peak in 1895 when 309,800 pounds of fish valued at \$25,638 were reported. Nearly equal quantities of lake trout and bass composed about 50 per cent of this total catch, while the balance was made up of smaller quantities of the other species of fish.

The first significant change in the composition of the reported commercial fishery was that resulting from an Order-in-Council passed in 1903 by which the sale of all game fish was prohibited. The population of bass and maskinonge, which had formed 27% and 19% respectively of the commercial fishery which

totalled 4,476,205 pounds between the years 1868 and 1908, was thereby reserved solely for the angler. The lake trout, whitefish, and other fish also received a degree of protection under a regulation of 1897 which prevented the taking of any fish by net, seine, snare, trap, weir, or nightline in any inland water without a licence. During the early 1900's there was a great deal of agitation for a spearing licence from local residents whereby they would permit them to utilize the fish "rather than save them for the tourist anglers". This licence was granted some years later.

It was not apparently until after the prohibition of netting and spearing that interest was developed towards the fishing of whitefish by hook and line. An overseer's report of 1904 remarked that "it has been discovered that whitefish take baited hooks readily if they are lying on the bottom" and that the winter fishery had developed into a good sport for residents. The spring, fall, and winter fishery for whitefish was found to be a profitable one and a considerable local market was developed. At the present, large quantities of Lake Simcoe whitefish are sold by resident anglers to local people and to unsuccessful sport fishermen.

The regulations of 1903 appeared to destroy any enthusiasm towards a legal commercial fishery during the next few years. The insignificant fishing returns between 1903 and 1910 separate the fishery of the previous 40 years from the somewhat different type of fishery which followed. During the early 1900's, there was a tremendous increase in the population of carp which had been introduced accidentally near the end of the preceding century. These fish first became particularly abundant in the Holland marsh and Cook's bay where they were caught and carried away by the ton by the local people. As no seine licences were issued until 1910, there is no commercial record of the capture and sale of carp before that date. The abundance of carp is indicated by the report of 462,406 pounds taken by seines in 1911. In that year, carp constituted some 81% of the commercial fishery.

In 1907, under the new Game and Fisheries Act, three applications for nightlines were granted for Lake Simcoe for the purpose of ridding the lake of some of the objectionable coarse fish, particularly burbot or ling. However, the local overseer commented that the number of whitefish caught by this equipment far exceeded that of ling. The number of nightline hooks reached a maximum of 6500 in 1919 and dropped to 3200 in 1920. Although this level was maintained through 1930, no licences were issued for the lake by 1940.

A most striking feature in the commercial fishery was the period of low returns during the first decade of the present century which so conveniently divided the fishery into two distinct periods: the earlier period, 1868-1908, when lake trout, bass, maskinonge, whitefish, and herring dominated the fishery; and the later period when carp and coarse fish formed the bulk of the fishery.

After 1910, the netting of carp became quite profitable with the result that 21 seine licences, totalling 4,320 yards in length, and 26 trap net licences were issued in 1927. During the period of 1910 to 1929, the reported sale of 3,427,330 pounds of carp represented some 70 per cent of the commercial fishery. Early in this period, the demands of the local people finally resulted in legalized winter spearing through the issuance of special resident spearing licences valid during

the months of December, January, February and March and, by 1920, there were 122 licences granted which resulted in the spearing of large numbers of lake trout and whitefish.

The quantity of carp taken during the decade 1930-1939 was much below that of the previous two decades and was not much greater than the combined return for lake trout, whitefish, and herring, or the catch of miscellaneous coarse fish. The period from 1940 to 1952 was marked by a rapid decrease in the carp fishery. The low catches of 700 and 3,090 pounds in 1948 and 1949, respectively, was largely responsible for no fishing activity in 1950. Following the capture of only 1000 pounds of carp in 1951, fishing was again discontinued in 1952. In 1953, in spite of the small amount of carp taken during the past 12 years, this species continued to dominate the commercial returns as a result of the abolition of the winter spearing licence for whitefish and lake trout in 1941. Coarse fish licences issued for Lake Simcoe in 1953 included three dip nets (10 square feet) for the Holland river, one dip net for the Pefferlaw river, one 100 yard seine for the Holland river, and another for the lake in the vicinity of Thorah island.

Commercial catches of mixed coarse fish totalling nearly $1\frac{3}{4}$ million pounds were reported between 1868 and 1954. Those species classed as coarse fish included primarily the white sucker, rock bass, and sunfish. Large quantities of perch and catfish were included sometimes in this group and burbot occasionally. The record of the mixed coarse fish fishery is given in Figure 2.

Except for the report of one barrel of mixed coarse fish in 1869, it was not until 1887 that catches of coarse fish appeared in the commercial returns when 10,000 pounds were reported. Average catches of 22,000 pounds were listed annually from 1887 until 1902. In 1903, no catches of coarse fish were reported and catches continued low until 1912 when nearly 33,000 pounds were taken. From that year until 1939 the commercial fishery showed a fluctuation between 14,500 and 93,000 pounds annually. Since 1940 the catches of coarse fish have been insignificant, excepting some 16,000 pounds in 1943. The low or nil annual returns during the past decade (1944-1954) represent a lack of interest in the fishery rather than a marked change in the coarse fish population.

The netting of minnows for sale to anglers forms a part of the commercial fishery of Lake Simcoe. The large population of lake shiners, *Notropis atherinoides*, makes this a rather profitable practice when the minnows move in along the lake shore. The minnow licences, first issued previous to 1920, are of two types: the commercial minnow seine net licence, and the commercial minnow dip-net licence.

Commercial minnow licences issued for Lake Simcoe during 1954 covered 18 seines and 14 dip nets. Voluntary reports from these fishermen indicated an annual sale of live Lake Simcoe minnows in excess of 150,000 fish. This number may be considered small in comparison to that taken by anglers for their own use. The practice of salting quantities of minnows for the winter fishery will be described in a later section. Anglers are permitted to take minnows for personal use by means of a dip net up to 3 feet square without a licence, and by means of a seine up to 30 feet in length under the authority of a \$1.00 licence.

The present status of the fishery has resulted from the gradual suppression of the commercial fishery in favour of a sports fishery reserved for the angler. The trend of the commercial fishery and the equipment licensed during the first year of each decade from 1870 until 1950 is shown in Table II. It may be seen that the series of regulations enacted during this period gradually limited the commercial fishery to its present state, namely: the seining or dip netting for minnows and coarse fish, and the capture of whitefish by enterprising resident anglers. In recent years, the revenue derived from the local whitefish and herring market is known to have far exceeded that from the combined sale of minnows and coarse fish.

TABLE II
 LICENSED COMMERCIAL FISHING EQUIPMENT IN LAKE SIMCOE
 ISSUED IN FIRST YEAR OF EACH DECADE, 1870-1950

YEAR	Gill Nets		Seines		No. of Trap Nets	No. of Nightline Hooks	No. of Spears	Commercial Minnow Nets	
	No.	Yards	No.	Yards				No. of Dip	No. of Seines
1870.....	1	1,600	0	.....	0	0	0	0	0
1880.....	9	25,850	0	.....	0	0	112	0	0
1890.....	0	.....	0	.....	0	0	0	0	0
1900.....	0	.....	0	.....	0	0	0	.....	.....
1910.....	0	.....	1	200	0	700	0	.....	.....
1920.....	0	.....	6	1,400	5	3,200	122	.....	.....
1930.....	0	.....	16	2,930	26	3,200	86	.....	.....
1940.....	0	.....	10	1,000	13	0	68	.....	.....
1950.....	0	.....	3	1,200	4	0	0	14	18

As this account of the commercial fishery has been only an outline of its history, the economics of each of the important fishes will be considered in the discussion of the fishes of the lake.

THE SPORT FISHERY

Lake Simcoe has an extensive sport fishery. As a result of this variety in the species of fish entering the fishery, angling is spread over the entire year. Fishing is at a minimum during a short period in the early spring and late autumn when the ice covering on the lake is unsafe, and during the month of October (October 6-November 5) when angling for lake trout and whitefish is prohibited and closed seasons on most game fish are already in effect.

The sport fishery in the lake may be divided conveniently into two parts, namely, fishing through the ice in the winter, and fishing from boats and from

the shore during the balance of the year. The following outline of these two general types of fishing will describe their earlier development and present status. This general description of the sports fishery will be considerably expanded in the discussion of the fishes of Lake Simcoe in a later section of this paper.

THE WINTER ICE FISHERY

The winter ice fishery of Lake Simcoe has continued to gain in popularity through the years. The increasing interest in this fishery previous to 1900 led to the establishment of fisheries regulations which have been continually modified in accordance with public opinion, presumedly in the best interests of the fishery.

During the period of early settlement around the lake shore, the settlers copied very closely the fishing habits of the Indians. The winter fishery was concerned largely with the spearing of lake trout and whitefish through the ice, an art at which the Indian had become very proficient. In this type of fishing, the fisherman first cut a hole through the ice, often over two feet in thickness, by means of an axe, saw, or ice-chisel. In early days he squatted near the one to two foot square opening in the ice and with poised spear awaited the appearance of a fish below the hole. Although often braving the wind and cold with nothing more than warm clothing and great personal fortitude, the fishermen frequently gained protection by draping animal robes over them. This tent-like arrangement also facilitated the observation of fish in the dark water by eliminating bothersome overhead light.

An early recognition of the advantages of a fishing shelter soon resulted in the construction of wooden fish houses and it is from these that most of the fishing now is done. The houses are of very light construction in order that they may be hauled over the ice on small hand sleighs. A typical lake Simcoe fishing hut is shown in Figure 3. The average hut has a floor space about 4 feet by 6 feet and is so low that a person may only sit down or stoop while inside. The interior customarily has a bench running the length of the hut and is heated by a diminutive stove, often fashioned from a gasoline or oil can.

In front of the bench, there are usually either one or two holes in the floor through which the fishing is done. The base of each house is frozen lightly into the ice to hold it in place and is often anchored in other ways as well. Although offering greater comfort, larger houses are unpopular as their increased weight makes transport on the ice more difficult, and their increased area allows greater opportunity for damage or destruction by wind. During the time when winter spearing was legal, many of the houses had a small hole in the roof through which the long handle of the spear could protrude. As early as 1908 some 80 fish huts could be seen on the herring grounds near Gilford.

A count of the number of fishing huts on the Lake Simcoe ice was made at the time of greatest fishing activity each winter from 1949-50 to 1952-53 and clearly shows the present interest in the fishery. In 1949-50, there were slightly under 800 huts, in 1950-51 over 1100 huts, and in 1951-52 about 1300 huts.



Figure 3—A typical Lake Simcoe fishing hut.

As a result of poor ice conditions during the winter of 1952-53, the number of fishing huts decreased below 1200. During 1953-54, the number rose to an all time high of nearly 1800 huts. During favourable weather, few huts are unoccupied on Saturday or Sunday and a large percentage of the fishermen are from outside points. For the balance of the week, resident or neighbouring fishermen predominate although a number of urbanites are usually scattered over the lake, particularly on Wednesdays. The demand for fishing huts has been sufficiently great that a number of residents have developed a good business in their rental at moderate rates, seldom over \$5.00 per day.

For the rental fee, all fishing tackle and bait is supplied and often transportation across the ice, if the hut is located at a distance from shore. The transporting vehicle is usually an automobile, snowmobile, or propellor-driven ice scoot. The transporting equipment used by the Department of Lands and Forests for patrol work on Lake Simcoe is shown in Figure 4.



Figure 4—Propellor-driven ice scoot used on Lake Simcoe.

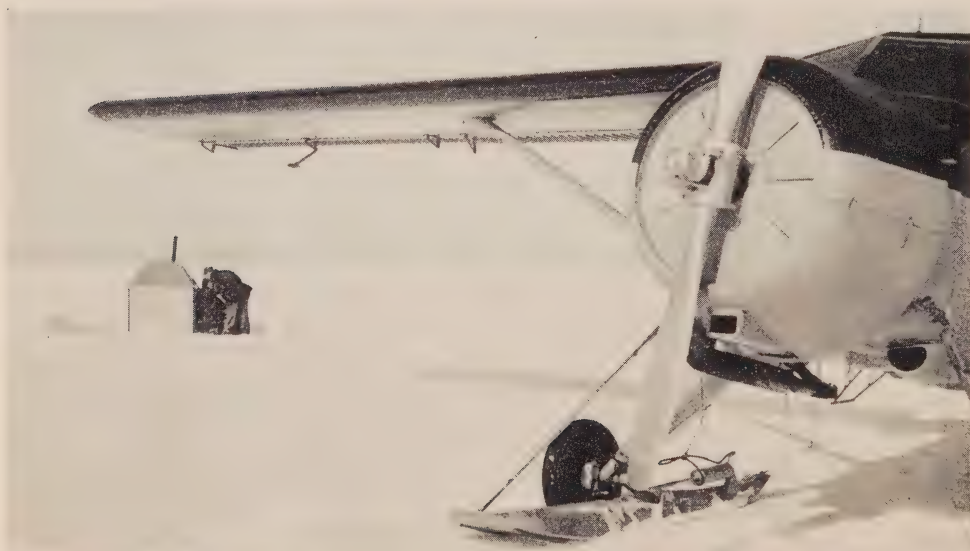


Figure 5—Biologist and Conservation Officer checking fishermen by Beaver Aircraft.

Although detailed discussion of the winter fishery shall be postponed until the later consideration of the fishes by species, certain significant changes in the methods of fishing through the ice should be outlined here.

Following the abolition of both netting and spearing in Lake Simcoe near the end of the past century, few whitefish were taken as it was apparently believed that the only implements of capture had been banned. Angling for whitefish had become popular and has remained so until the present time when angling for this species constitutes an extensive sport fishery and, in addition, is of considerable commercial value to the skilled angler.

The practice of prebaiting on whitefish grounds is a customary practice. This is accomplished by scattering bait on the lake bottom immediately below the hole in the ice. Lake shiners are usually readily available around the shore in the autumn and are salted down for later prebaiting. Under existing regulations each person is allowed to have 40 pounds of minnows in his possession during the winter months. Larger families, therefore, may retain considerable quantities of minnows. Salted minnows are used for bait usually only when live minnows are not available. In the absence or scarcity of minnows, such substances as cooked rice or grains are used for prebaiting.

The spearing of lake trout through the ice was practised successfully since the earliest records of the Lake Simcoe fishery and although the spearing of trout was made unlawful for a few years at the turn of the century, it is doubtful that the practice was considerably curtailed during that period. At any rate, local agitation resulted in the revival of legalized spearing under the authority of a special winter spearing licence which was valid during the winter months. The maximum number of 122 spearing licences issued in 1920 would seem to represent only a proportion of the actual number of spearers for, according to statements from local fishermen, illegal spearing was a very common practice and the offenders were seldom apprehended. With the discontinuance of all winter spearing licences for Lake Simcoe after 1940, law enforcement officers were able to gain control of the winter fishery and have actively discouraged attempts at spearing during the winter months.

The technique employed for the spearing of lake trout through the ice in Lake Simcoe differed little from that originally used by the Indians. Most of the fishing during the present century was done from fish houses with no equipment other than a small wooden decoy and a long-handled spear, often 15 feet in length. This equipment is shown in Figure 3. The decoys resembled a fresh-water herring in general shape and size and were hand-made from a piece of wood with metal fins. The fins were ingeniously arranged so that by a periodic pulling of the attached line the decoy was made to swim in a circle with realistic, darting movements which lured the lake trout within striking range of the spear. Although some decoys were equipped with hooks, it was not until the abolition of spearing that hooked decoys were used extensively. The hooked decoy is similar to the decoy already described but it is used to both lure and capture the trout in the same way as plugs are used in casting and trolling during the summer months. Lake trout are captured occasionally on whitefish and herring baits, particularly live minnows.

As freshwater herring are abundant in the lake, it is only natural that they should form a part of the winter fishery. The popularity of herring fishing is probably caused primarily by the location of the better herring grounds near the shore, often near stream mouths or in shallow bays. These locations may be reached quite easily by fishermen not wishing a long tramp on the ice, and provide angling when ice conditions in the open lake are unsafe. The herring takes almost any type of bait readily and offers very tasty eating if properly prepared. They are widely distributed over the lake in the winter and are taken quite frequently while fishing for whitefish.

The only other kinds of fish which are taken through the ice in significant quantities are the northern pike, the yellow perch, and the ling or burbot. Small numbers of northern pike are captured in Cook's bay at the extreme south end of the lake where this fishery attracts many winter fishermen. The bays in the vicinity of Orillia at the north end of the lake offer very limited winter pike fishing. Elsewhere in the lake, pike are rarely fished during the winter although infrequently captured while fishing for other species, particularly along the east shore. Perch are caught in the shallow bays, along shoals, off points or river mouths, and occasionally along the shore. Perch fishermen depend mainly on live minnows for bait although perch may be taken on a whitefish or herring bait.

Burbot are caught more-or-less accidentally each winter by anglers seeking other kinds of fish but, unfortunately, are considered unpalatable by most fishermen and are not too commonly eaten. As a result of a voracious appetite of the burbot for minnows and the young of other fish, its presence in the lake is not favourably regarded by the fishermen.

THE OPEN WATER FISHERY

As soon as the ice leaves the lake in the spring, fishing from boats and from the shore begins. From this time until the ice forms again late in the following autumn, varying numbers of fishermen frequent the lake more-or-less unceasingly, reaching their lowest activity during October when most species of fish are protected by closed seasons. Stormy weather and rough water in this relatively unprotected lake constitute a considerable limitation on fishing pressure on the open lake.

Although angling is now the only recognized method of sport fishing in Lake Simcoe, with the exception of taking coarse fish with dip nets during the months of April and May, it was not always so. In early days, actually until late in the 19th century, it was difficult to distinguish between a commercial and a sport fishery as any type of fishing equipment was legal and there was no restriction on the sale of game fish. While there is no doubt that the various types of fishing were considered excellent sport, a large proportion of the captured fish were sold. The commercial returns report for Lake Simcoe, as given in Table I, indicate the extent of the catches of those species which became known as game fish in later years. As no record was kept of the fish taken for home consumption or for local sale, the actual catch of fish would be very much greater than that given in the annual reports.

Previous to 1890, some restrictions had been placed on length and creel limits, and closed seasons had been placed on largemouth bass, smallmouth bass, maskinonge, pickerel, lake trout, and whitefish. Gill-netting was curtailed in 1892. However, there was no appreciable change in the quantities of these fish sold until 1902-3 when the sale of game fish (largemouth bass, smallmouth bass and maskinonge in Lake Simcoe) was prohibited by Order-in-Council. During the remainder of the first decade of the present century angling was the only legalized method of capture for fish other than perch, catfish, and coarse fish. The regulations affecting those species now recognized as game fish have remained essentially unchanged since that time except for a relaxation in restrictions on lake trout and whitefish through the adoption of a winter spearing licence shortly after 1910. With the final abolition of this licence in 1941, the lake trout became truly recognized as a game fish in Lake Simcoe for it can now be taken legally only by angling and trout caught in this way may not be sold.

The open water fishery of Lake Simcoe may be divided conveniently into three periods: (1) the spring period when anglers concentrate on the capture of lake trout, whitefish, freshwater herring, perch, pike and pickerel; (2) the summer period when the principal species caught are the lake trout, smallmouth bass, pike, perch, whitefish, and fewer largemouth bass, maskinonge and pickerel; (3) the autumn period when the catch is made up largely of whitefish, freshwater herring, fewer lake trout, pickerel, pike and perch, and an occasional rainbow or steelhead trout.

The fishing pressure exerted on the Lake Simcoe fishery is indeed great. During the summer months there is an influx of cottagers to their cottages, which rim much of the shoreline, many of whom join the resident fishermen on the lake. In addition, a great number of summer tourists regularly take advantage of Lake Simcoe's fine beaches for bathing, and its extensive waters for boating and fishing. While most of these tourists come from towns and cities in southwestern Ontario, particularly Metropolitan Toronto, many Americans are annual visitors to the lake.

The percentage of fishermen among these groups is difficult to assess although an interest in fishing is high among the permanent residents, cottagers and summer tourists, alike. A survey of boat rentals around Lake Simcoe has shown that over 800 boats are available to fishermen. This supply of rental boats is generally inadequate to satisfy the demands of fishermen during weekends of the spring and summer months. The pressure on rental boat liveries is somewhat alleviated by those tourist fishermen who bring along their own boats for a day's outing.

There are not many inland lakes which offer a game fishery equal to that of Lake Simcoe. Few lakes offer the sport fisherman such a wide choice in kinds of fish during all four seasons of the year. Still fewer lakes could have maintained the quality of fishing while lying adjacent to the most heavily populated area in Ontario.

FISHES OF THE LAKE

THE STURGEON

It is of historical interest that the annual commercial returns for Lake Simcoe record the sale of 136,500 pounds of lake sturgeon, *Acipenser fulvescens*, between 1881 and 1898. The annual catch diminished rapidly after 1894 (see figure 2). Although it is probable that a few sturgeon were present in the lake for several more years, no later reference to this species in Lake Simcoe can be found until the capture of a 42-inch fish on a whitefish lure during January of 1956 near Jackson's Point. This sturgeon may have been one of a small residual population still in the lake but, more probably, one of three sturgeon which escaped into the lake from a private pond during the heavy flood in 1954. The failure of anyone to recall the presence of sturgeon in Lake Simcoe during the past 50 years suggests that there was no significant population in the lake by the beginning of the present century.

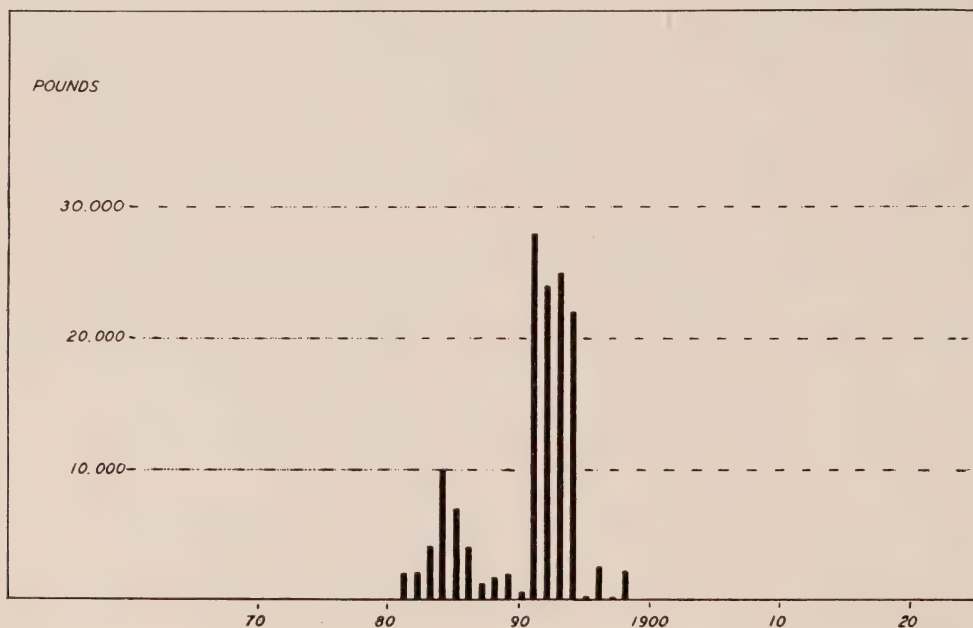


Figure 6—Commercial fishing returns for Sturgeon in Lake Simcoe.

THE COMMON WHITEFISH

HISTORY AND STATUS OF FISHERY

The whitefish, *Coregonus clupeaformis*, abundant in Lake Simcoe waters, had formed a valuable part of the commercial and sport fishery. This fish, apparently known to the Hurons as *Assihendo*, was prized by the Indians who probably captured large numbers in their weirs located at the Atherley Narrows which were described by Champlain in 1615. While references to the early fishery were infrequent, the Lake Simcoe whitefish soon became noted for its excellent quality, but small size.



Figure 7—Lake Simcoe whitefish.

The pioneers of the early 19th century, on observing that the Indians captured numbers of whitefish through spearing and netting in the autumn, joined the Indians in the practice of fishing which was so highly successful in providing tasty food for the table. Further, the whitefish was found to be readily marketable locally and a commercial fishery was developed by enterprising fishermen. In 1868, the first year of commercial returns, the sale of some 8,000 pounds of this fish was reported which represented only an unknown portion of the total annual catch. In the following years, the reported annual sale of whitefish fluctuated between 2,000 and 86,000 pounds until 1887 (see figure 8). From 1887 through 1894, the negligible returns would not seem to reflect any reduction in the availability of the whitefish as local fisheries overseers would surely have mentioned any significant decrease in abundance.

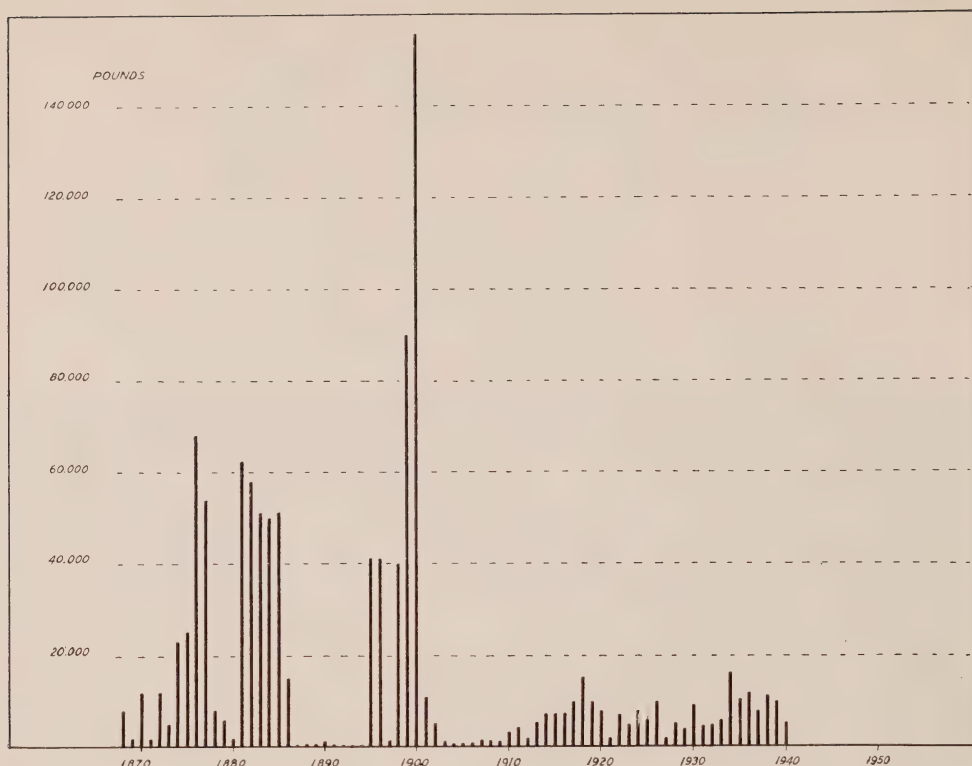


Figure 8—Commercial fishing returns for whitefish in Lake Simcoe.

An important development which was to affect greatly the future whitefish fishery occurred about 1900. Until that time, it was believed by most fishermen that whitefish could be taken only by gill netting and spearing. The regulations which made it unlawful to spear or net in the lake, therefore, caused concern and anguish to the whitefish fishermen. However, these fishermen soon discovered that whitefish could be taken readily on baited hooks, if left lying on the lake bottom. The winter angling of whitefish appealed to many local people as good sport and it was practised extensively by the resident fishermen.

The reason for the remarkable increase in the commercial catch of whitefish between 1895 and 1902 has not been determined positively, but available information suggests that it may have been related to the sudden popularity of winter angling. The lack of annual reports on Lake Simcoe whitefish from 1903 to 1906 represented no significant decrease in the annual catches but resulted from the fact that no licences for commercial equipment were issued in those years and, consequently, commercial returns were not required. From 1907 until 1940-41, annual reports on the sale of whitefish were required from those fishermen fishing under commercial licences. Since the latter date, commercial returns have not been required although large quantities of those whitefish taken

by angling are sold locally. The quantity of whitefish shown in the annual commercial returns for Lake Simcoe from 1868 to 1940-41 totalled 1,090,675 pounds.

It is of interest that nightline licences were issued for the purpose of catching coarse fish first in 1907. These nightlines were alleged to have taken more whitefish than coarse fish and, as a result of local condemnation, were discontinued eventually.

During the past 50 years, the whitefish fishery has not changed appreciably. The more important changes have been a discontinuance of legal spearing in 1941, a recent increase of interest in the whitefish by tourist fishermen, and a curtailment of autumn poaching during the past decade.

The winter whitefish fishery became concentrated on certain whitefish grounds which were usually located as close to the various centres of population as possible. The grounds, commonly located in 20 to 40 feet of water, were marked by clusters of fishing huts from which the fishing was done by a peculiar method known as "bobbing for whitefish". The whitefish, then as now, were widely distributed over the open lake and some moved southward into Cook's Bay during the winter.



Figure 9—Fishermen walking to whitefish grounds.

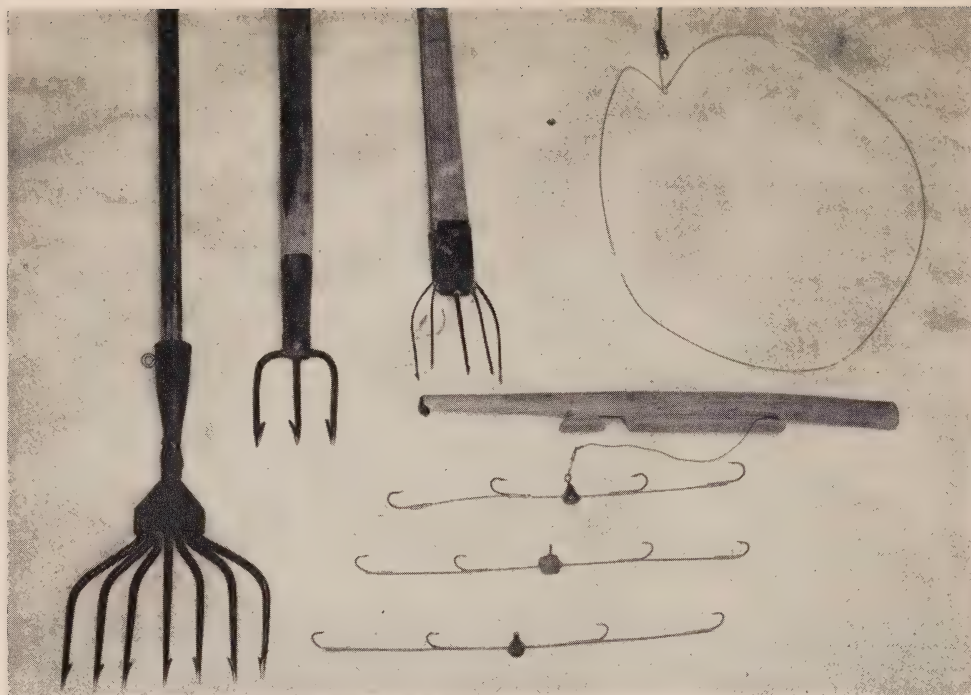


Figure 10—Illegal fishing equipment seized by Conservation Officers on Lake Simcoe. Snaggers (on right), spears (on left), and snares (in centre).

The practice of prebaiting is employed extensively in the winter fishery. A quantity of bait is scattered on the bottom immediately below the hole in the ice for several days in advance of fishing in order to attract whitefish to the grounds. Salted minnows are used commonly for prebaiting and often for baiting the hook, although live minnows are preferred for the latter purpose. Great quantities of lake shiners, usually readily available along the shore and rivers late in the autumn, are preserved in salt for winter use. In event of a shortage of minnows, substitutes include such substances as cooked rice, barley, other grains, or the chopped flesh of the burbot (ling). Small amounts of bait often are dropped down the hole while fishing but only enough to attract the whitefish without detracting from the angling quality.

A newer innovation to the winter fishery has been the practice of snagging, or gutting, with a device known as a “snagger”. The “snaggers”, a common type shown in Figure 10, vary considerably in detail but may be described as “instruments of rigid or semi-rigid material, with one or more unmovable or inflexible hooks, which may be manipulated in such a manner as to pierce and hook a fish in any part of the body other than the mouth”. This method of fishing became popular in several parts of the lake, including Kempenfeldt Bay, and reached its peak activity about 1952. This style of fishing requires very heavy and continuous prebaiting in order to lure the whitefish over the “snagger” that they may be hooked from beneath. The indiscriminate scattering of bait

on the bottom has been scorned by orthodox fishermen. Many of the captured fish have stomachs filled with salted minnows which suggests that the opportunity for catching whitefish by legal angling is decreased when both types of fishing are practised within the same group of fishing huts. "Snagging", while an effective way of taking whitefish, is nevertheless believed by some fishermen to be injurious to whitefish which are cut open by the "snagger" but escape.

Although "snagging" had been regarded with disdain by many sportsmen for some years, it was not until 1952 that the practice was clearly defined in the Special Fisheries Regulations for Ontario (Section 1: *q,r*) as an unlawful means of fishing whitefish. It is of interest that numerous experienced fishermen are of the opinion that legitimate angling is as satisfactory a method of capturing whitefish as "snagging", provided that the latter method (and accompanying heavy prebaiting) is not carried on in the immediate vicinity. The enforcement of this recent regulation has been received with strong approval of the people.

The greater part of the Lake Simcoe ice fishermen are concerned with the whitefish fishery. While resident fishermen, some of whom stay on the lake and fish continuously for several days at a time, take a large proportion of the fish, tourist fishermen frequently are able to catch considerable numbers of whitefish. However, even experienced fishermen experience extreme variations in angling success from time to time. Daily catches of 50 to 150 whitefish are not uncommon to resident fishermen while tourist anglers are usually well satisfied with a few fish. This is demonstrated by a limited creel census carried out on February 10, 1953, between Shanty Bay and Orillia on the west shore, representing 200 fishing hours which showed that each fishermen averaged 1.4 whitefish for each two hours of fishing. Within this group, one man had taken 13 whitefish in 2.5 hours; by contrast, another had fished for 15 hours without success. This variation in fishing success is typical among fishermen concentrated on any fishing grounds and is, in part, caused by differences in angling technique.

Many recreational fishermen catch up to 200 whitefish during the winter months while some catch many times this number. Resident anglers actually fishing commercially take individual catches of a ton or more of whitefish during the season which are sold to unsuccessful tourist fishermen, peddled from door to door, or disposed of through local stores which retail quantities of Lake Simcoe whitefish.

The angling technique which was used so advantageously in the ice fishery was modified early in the century for the purpose of fishing from anchored boats. An extensive autumn and spring fishery soon followed in which salted minnows were used generally for prebaiting while the hook, attached to a handline and lying on the bottom, was baited with live or salted minnows. Autumn and spring fishing were carried out at about the same locations, usually on shoals or near river mouths and in 10 to 70 or more feet of water at the various fishing grounds around the lake. The popularity of the autumn and spring fishery has thrived through the years and the favourite fishing areas have continued to be on the east shore of the lake from Island Grove to Jackson's Point and Beaverton and on the west shore from Kempenfeldt bay to Orillia although other areas are popular also.

The autumn fishery begins early in November following the closed season on whitefish and lake trout and continues until the formation of ice. In recent years the popularity of this fishery has increased until on warm, calm fall days numerous tourist and resident sport fishermen are found at several places on the lake. On weekends with fair weather, rental boats are often at a premium. However, a great portion of the autumn catch of whitefish is taken by resident commercial anglers whose perseverance in the face of cold and adverse weather conditions is rewarded by excellent catches of whitefish. At Jackson's Point, for example, some 30 local fishermen may each take 100 or more fish daily which are marketed profitably at 20-25c a pound. As late as December 30, 1952, there were 8 boats fishing whitefish off Jackson's Point. Similarly, on December 29, 1953, local fishermen were still angling from boats although Cook's Bay had frozen over and there were fishing huts on the shore ice near the Pefferlaw River mouth. The fact that quantities of spawning whitefish are taken in mid-November by autumn fishermen is regarded with disfavour by some people while other believe that the whitefish should be exploited when available to the anglers.

The spring whitefish fishery commences as soon as the ice leaves the lake, usually during early April, and continues until the whitefish leave the shoal areas and move into deeper water for the summer months. The spring fishery is similar to the autumn fishery. It is carried out on about the same grounds with the same equipment and by about the same composition of sport and commercial fishermen. Angling success is often good. Local commercial anglers, particularly on the east shore of the lake, derive considerable income from this fishery. The popularity of recreational angling for whitefish has increased in recent years and on the first warm days of April many sport fishermen may be seen on the lake. For example, over 200 fishermen were observed fishing from boats and from the wharf at Beaverton harbour on April 12th, 1953, where single catches of 15 or more whitefish were common.

Interest in the summer whitefish fishery drops to a low level when compared to that of the other seasons. Sport fishermen commonly turn their attention to the game fish while most commercial anglers have returned to farm work or other employment. However, there are a few commercial fishermen, including some Indians from Georgina Island, who angle for whitefish in deep water by the same means as used in the spring and autumn fishery. Also, there are a small number of sport fishermen who seek whitefish during the summer months. The summer fishermen often mark their grounds, usually in 70-90 feet of water, with wooden buoys to which they anchor while fishing. Considerable quantities of whitefish are taken by these summer fishermen.

In considering the summer fishery, it is of interest that very small numbers of whitefish are taken accidentally each year while trolling lake trout in deep water. For example, one lake trout fishermen took seven whitefish in this way during 1953. Some of the whitefish taken on lake trout baits are caught in the mouth, others are snagged in the body by hooks.

While the common Lake Simcoe whitefish is a slow-growing fish which remains relatively small through life, a comparatively low population of whitefish is also present in the lake which grows more quickly and attains a greater

size. A prevalent but erroneous belief among the fishermen is that the smaller variety is not a true whitefish but rather a cross between the whitefish and the lake herring. The larger variety, known locally as "humpback", is similar in growth and appearance to the commercial whitefish, *Coregonus clupeaformis*, of the Great Lakes. It is a popular belief that its presence in the lake may be attributed to the planting of non-native hatchery whitefish which have been made for many years and that they only occasionally take a baited hook.

The first planting of 200,000 whitefish fry, hatched from the eggs of Lake Ontario whitefish at the Newcastle Hatchery, was made in 1888. Between that time and 1955 (see Table III), a total of 28,134,000 whitefish fry have been planted. In recent years, the whitefish have been of Georgian Bay stock and reared at the Provincial Fish Hatchery at Collingwood.

TABLE III
PLANTINGS OF WHITEFISH IN LAKE SIMCOE

YEAR	Number of Fry	YEAR	Number of Fry
1888	200,000	1944	1,000,000
1889	200,000	1949	500,000
1936	34,000	1950	1,000,000
1937	2,200,000	1952	.....
1938	2,500,000	1953	5,000,000
1939	1,500,000	1954	5,000,000
1940	1,500,000	1955	4,500,000
1941	3,000,000	Total	28,134,000

LIFE HISTORY

Distribution: The whitefish move into the shoal areas of Lake Simcoe in advance of the spawning season in November and also spread over Cook's Bay and other bays. Following spawning the whitefish may be found at depths from under 10 feet up to 90 feet of water in various parts of the Lake. Much of the angling is done in less than 40 feet of water except in the Kempenfeldt bay area where the water is deeper.

The winter distribution is about the same as the whitefish move about locally in schools but favour certain shoal areas, some of which are over 50 feet in depth. In spring, the whitefish continue to be widely distributed through the open lake, Cook's Bay, and Kempenfeldt Bay and fishing grounds are essentially the same as in the autumn. Whitefish are taken from fleets of boats anchored on shoals, near river mouths, and from wharfs such as those at Beaverton, Jackson's Point, Eight-mile Point, and Kempenfeldt Bay. Some whitefish move into river mouths and even small creeks in the spring.

Warming water of late spring causes the whitefish to forsake the shallow waters of the lake for the cool deep waters where they locate at depths of 80 to 95 feet of water. Sudden and extreme increases in spring temperatures occasionally trap schools of whitefish in shallow water and result in local mortalities. The most recent and one of the heaviest mortalities on record took place on June 10, 1950, when thousands of fish, about 20% whitefish and 80% herring, died in a pocket in Cook's Bay near Gilford and were washed up along the shores of the bay.

Age and Growth: The common whitefish of Lake Simcoe is a slow-growing form which enters the sport fishery in quantity at 4 to 6 years of age. The average size of those whitefish taken by angling is from $\frac{3}{4}$ to $1\frac{1}{4}$ pound at an age of 6 to 9 years. It is of interest that for many years commercial anglers have reckoned the poundage of their commercial catches on the basis of 12 to 15 pounds per dozen fish. A number of older fish weighing from one to two pounds are taken but captures of common whitefish over two pounds are rare. A common whitefish weighing nearly $2\frac{1}{2}$ pounds was aged at 15 years.

The larger form of whitefish, known locally as the "hump-back", is taken in comparatively small numbers by anglers but grow at a rate quite similar to that of the commercial whitefish of the Great Lakes. These fish attain a weight of one pound in their third and fourth years and continue to grow rapidly to 5 or 6 pounds by their 12th to 15th year, at fork lengths of about 22 or 23 inches. The largest whitefish reported authentically for Lake Simcoe weighed some 8 pounds.

The growth curves of the two forms of whitefish found in Lake Simcoe waters are shown in Figure 11.

Breeding Habits: The Lake Simcoe whitefish spawn in the middle of November, usually reaching a peak between November 15th and 21st but sometimes continuing until later in the month. Spawning takes place on the extensive sand, gravel, and stony shoals of the lake from the shoreline outward to at least 15 feet of water. The whitefish mature between their third and 6th years of life with reproductive potentials upwards of 5,000 eggs.

The whitefish do not construct nests but scatter the eggs and milt at random over the lake bottom until the supply is exhausted. The eggs receive no parental care and the young fish hatch late in the winter and form large schools as they feed in the shoal areas.

FOOD

The whitefish is the only sport fish of Lake Simcoe adapted to bottom feeding and its only notable competitors for food are the suckers. As there are considerable seasonal variations in the distribution of the whitefish, it feeds on a variety of organisms.

Most common items of food are the molluscs and aquatic insect larvae and nymphs, particularly those of the chironomids, mayflies, and caddisflies. Other items include plankton, crustaceans, terrestrial insects, and small fish. In Kempenfeldt Bay, Beaverton, and other areas where there is an extensive baiting of whitefish, salted minnows and grain occur quite regularly in the stomachs

of the whitefish. Small quantities of aquatic vegetation are found in a number of stomachs and apparently were taken in with preferred foods. Rawson (1930) reported that eyed herring eggs were found in the stomachs of whitefish caught at Jackson's Point on March 1, 1928.



Figure 11—Growth curves of Lake Simcoe whitefish:
(1) smaller and common type; (2) large and less common type.

ANGLING

Angling for whitefish by commercial and sport fishermen has become so widespread that there is considerable variety in fishing techniques although all methods are modifications of those developed by earlier resident fishermen. However, there is a great deal of variation in the success with which the techniques are employed and few tourist fishermen can compete with the experienced residents in proficiency.

The baiting of whitefish grounds usually precedes angling and attracts whitefish to the fishing area. Live minnows are preferred for baiting the hook although salted minnows are used most commonly. As the whitefish is primarily a bottom feeder, the baited hook is allowed to rest on the bottom.



Figure 12—A sensitive "tip-up" used to hold line in fishing whitefish.

The whitefish has a very tender mouth and care must be taken not to lose a fish by tearing the mouth while landing it. While fishing from boats many experienced anglers insert a rubber band, often a thin section of an auto inner tube, into the fishing line above the sinker which cushions the shock when the line is pulled. The hand line is often wrapped around a spool or short wooden rod which is held in the hand and, as the whitefish bite so lightly, the bait is continuously raised and lowered slightly to determine the presence of a whitefish on the hook. The technique is modified while angling from fishing huts where a "bobber" or "tip-up" is employed which holds the line while balanced on a steady support. Movement of the "bobber" indicates that a fish has touched the bait. Fishermen angling from a fishing hut are shown using a "bobber" in Figure 12.

A simple technique used by some fishermen is a match tied horizontally to the fishing line a short distance above the water. When the line is suspended from the fishing hut a movement of the match will indicate the interest of a fish in the bait. If it is a whitefish, the match will usually move slightly but a herring will cause the match to spin around. While these and other methods are used with success by some fishermen, others prefer to dispense with all apparatus except a line, a sinker, and a baited hook. When fishing from wharfs, anglers generally cast out with a minnow and leave it lying on the bottom for the whitefish to pick up.

REGULATIONS

The use of gill-nets, seines, and other commercial nets was prohibited by law in the late 19th century although nightlines and spears were allowed for a time during the present century. Legal spearing under a special licence was discontinued finally in 1941.

The only restrictions on the angling of whitefish have been an autumn closed season established in 1889 and those general laws and regulations which control fishing with hook and line. The closed season of 1899, extending from November 1st to 30th, was modified in 1918 to the period October 5th–November 5th. This was changed in 1934 to read October 15–November 15th, and again in 1936 to October 5th–31st. In 1940, it reverted to October 15th–November 15th but since 1946 the closed season on whitefish and lake trout in Lake Simcoe has included the period from October 6th to November 5th.

MANAGEMENT

Lake Simcoe has continued to produce an abundance of whitefish. As there have been no length or creel limits during the history of the fishery and the whitefish has been without protection during the spawning season since 1918, further regulations for the conservation of this species would seem unnecessary. Although angling pressure continues to increase annually, it is improbable that even the most intensive angling can equal the extensive harvest of whitefish common in the earlier years when the fishery was subjected to combination of angling, spearing, nightlines, and netting.

The original closed season established in 1889, extending from November 1st to 30th, covered the spawning season for whitefish but the closed seasons

imposed since 1918 have been of no value in the protection of the whitefish while on the spawning beds. Although there has been some agitation for protection of the whitefish through November in order to end the capture of whitefish containing ripe roe by a few resident fishermen in the Beaverton and Jackson's Point area particularly, this fishery would not seem to be detrimental to the welfare of the species. However, commercial anglers should not take more whitefish than can be readily marketed locally as whitefish spoil rapidly under normal autumn weather conditions. The only regulatory controls should be those required to prevent fishing by means other than angling and unnecessary waste which are not sympathetic to the modern trend of the fishery favoured by the majority of sport fishermen. While there is no suggestion that angling could reduce the whitefish population to a near-critical level in Lake Simcoe, it is a remarkable biological feature of other waters that the size of the spawning population of whitefish has no noticeable effect on the resulting populations because of the high reproductive potential of the surviving fish. The present restocking programme would appear to be without merit at above-critical population levels.

The quality of the whitefish fishery of Lake Simcoe may be expected to fluctuate in future years but no amount of protection would be expected to prevent at least local depressions in the fishery.

THE FRESHWATER HERRING

(1) THE BLUEBACK OR LAKE HERRING

The freshwater herring, or ciscoe, *Leucichthys artedii*, is present in large numbers in Lake Simcoe where the fishermen differentiate between two apparent colour phases which are known locally as "bluebacks" and "sand herring".



Figure 13—A Lake Simcoe ciscoe, or freshwater herring.

Commercial catches of freshwater herring have been low in comparison to those of lake trout and whitefish as indicated by the commercial returns from 1868 to 1940 which report a catch of 351,522 pounds of herring. This represented about 10 per cent of the poundage of lake trout and whitefish taken, and 3.5 per cent of the total reported catch of all species during that period. Reference to Figure 14, which presents the reported commercial catch during the history of the fishery, shows that a high percentage of the total catch of herring occurred in the period previous to 1900. These fish were taken by gill netting and consequently, when this activity was made illegal, the annual reported catch assumed an insignificant level, reaching a peak of only 3,900 pounds in 1919. However, there is no doubt that illegal gill netting continued. It must be presumed that those herring reported commercially in the latter period were taken with hook and line.

Angling for freshwater herring has been practised for many years. However, there are no references to indicate whether or not the early settlers learned to fish for herring from the Ojibway Indians.

The winter herring fishery attracts the greatest number of local and tourist fishermen who customarily fish through the ice from fishing huts located along a sand or gravel shore in from 18 inches to 15 feet of water, or near creek and river mouths. The greatest interest in the winter herring fishery occurs near shore at times when ice conditions on the open lake are unsafe, or heavy snow and extreme weather conditions deter most fishermen from a long walk on the

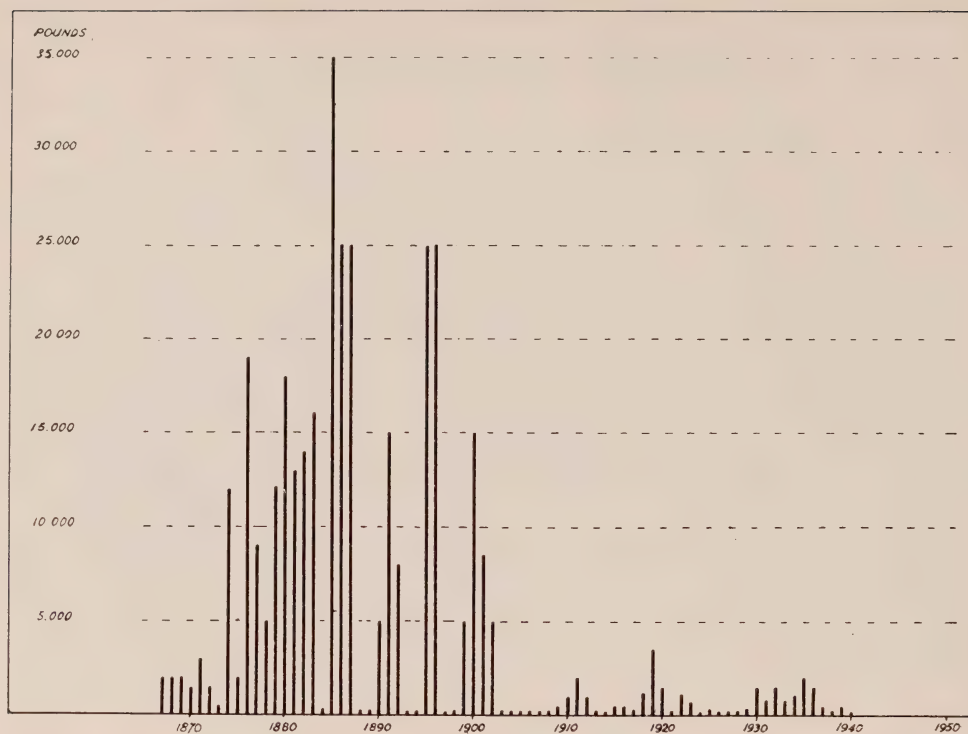


Figure 14—Commercial fishing returns for freshwater herring in Lake Simcoe.

ice to the whitefish and lake trout grounds. Winter fishermen, fishing with hand lines and hooks baited with minnows and a variety of items, are often able to catch from 25 to 400 herring per day each. Although often small in size these herring have an excellent flavour and are regarded highly as food.

The spring and autumn freshwater herring fishery has increased markedly in popularity, particularly among tourist anglers. On an agreeable autumn or spring day when the fish are biting, one may expect to see upwards of 50 boats of resident and tourist anglers anchored in Kempenfeldt Bay and fishing for herring with small hooks baited with live minnows, salted minnows, or artificial lures. Similar groups of anglers may be seen off Jackson's Point, Beaverton, and other places. A catch of 125 herring, averaging about $\frac{3}{4}$ pounds in weight, would be considered a good day's fishing by the better fishermen.

A remarkable event in the freshwater herring fishery occurs for about a ten-day period at the end of June or early July when these herring rise to the surface and feed on the swarms of mayflies, *Ephemeroidea*, which emerge at that time. Fishermen, fishing with artificial flies, or the newly emerged adult, or subimage of the large mayfly, *Hexagenia*, are each able to take up to 300 or 400 herring daily. The adult mayflies, or "shadflies" or "fishflies" are known locally as "spinners", the subimage as "duns". Herring can be taken by this

method of fishing in several parts of the lake, most notably in the Narrows at Atherley. While the angling is done commonly from boats, some herring may be taken while fishing from shore.

LIFE HISTORY

Distribution: The lake or blueback herring are pelagic and roam about the lake in schools. In early December they move into shoal areas where they spawn and remain associated with shallow water in the months that follow. Spring finds the schools of herring spread over the lake near shoal areas, around river mouths and docks, and at moderate depths.

Warming water temperatures in late spring drive the herring into the cooler water below where they generally remain at depths of 50 to 100 feet except for short feeding migrations into the upper water, particularly during the mayfly emergence of June and July.

The presence of lake herring in shallow water during the spring warm-up period results occasionally in local die-offs of herring when they become trapped in the shoal areas and are subjected to lethal temperatures or oxygen deficiencies. The latest serious mortality occurred on June 10th, 1950, when many thousands of herring died in a depression in Cook's Bay near Gilford (McCrimmon 1952). Similar mortalities of small extent have occurred at other locations in Lake Simcoe from time to time and may be expected to re-occur in future years with no permanent harm to the fishery.

Age and Growth: The lake herring grow rapidly in Lake Simcoe and reach lengths of 4-6 inches during the first year and up to 8 inches by the autumn of the second year. Although many of the herring taken by angling are considerably under a pound in weight and 3 to 5 years of age, numbers of larger herring are taken which reach lengths of 15 inches and weights over one pound by the sixth year while some 7-year-old fish reach $1\frac{3}{4}$ to 2 pounds. Few herring of larger size are present in the lake. The growth curve for the lake herring is given in Figure 15.

Breeding Habits: The adult lake herring move into the sand and gravel shoal areas of the lake in early December. Spawning takes place from right along the shore outward to at least 15 feet of water for several weeks in mid-December during which time the ice cover may form over the lake. Spawning is usually completed before the end of the month. The herring mature in the second and third years of life when they have a reproductive potential of some 12,000 to 30,000 eggs per female fish. The parent fish do not construct nests but merely scatter the eggs over the bottom. No parental care is given to the eggs or young fish which hatch in late winter. Survival of the schools of young herring is dependent primarily on an abundance of planktonic food and escape-ment from predators.

FOOD

The young lake herring feed quite exclusively on planktonic forms and early growth is dependent on the availability of plankton. Although plankton continues to be an important food of the lake herring, an increasing percentage of bottom organisms, including adult and larval insects and amphipods, occurs in

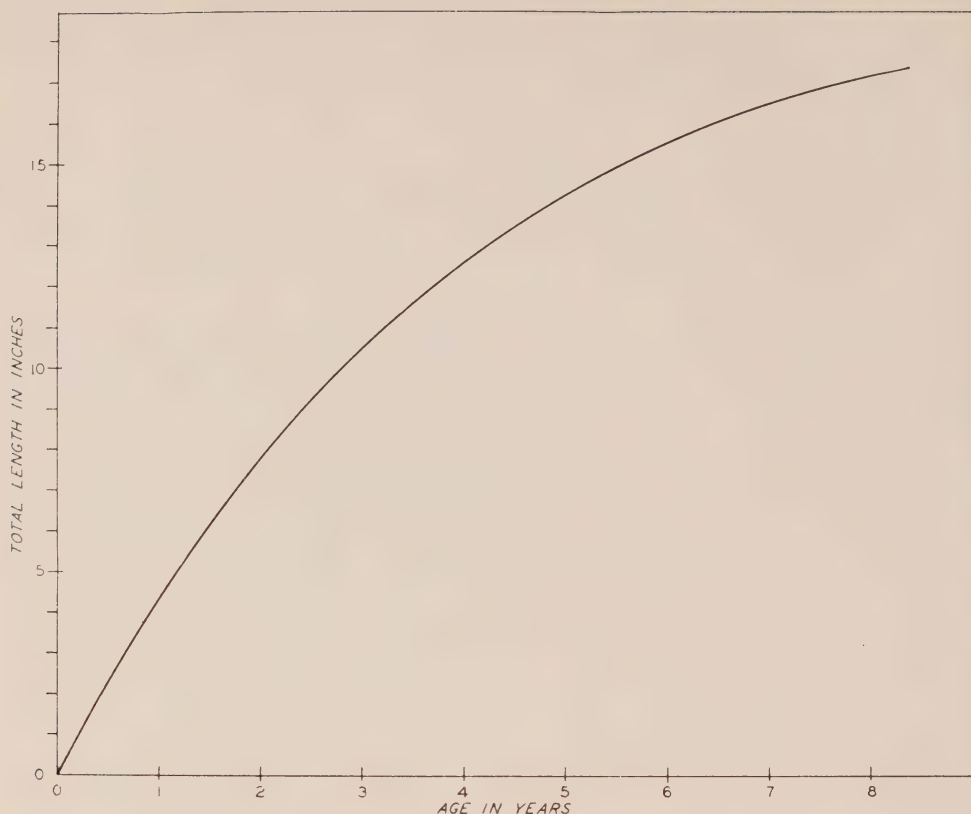


Figure 15—Growth curve for Lake Simcoe ciscoe, or freshwater herring.

the stomachs as the fish become larger. Terrestrial insects are eaten when available. The habit of the lake herring in feeding on emerging mayflies in early summer provides a sport fishery of considerable interest.

ANGLING

The lake herring are taken by angling on a variety of baits. For several days during the mayfly emergence in early summer, herring are taken at or near the surface of the water on mayflies or artificial flies. At other times anglers show individual preferences for particular methods of angling whether carried out from docks, boats, or through the ice. The fishing line is held in the hand or attached to conventional fishing gear. The hooks are small and usually of similar sizes to those used in fishing for speckled trout.

Small live minnows, usually lake shiners, are a preferred bait but salted minnows are considered to be greatly inferior. Little white beads, pearl buttons, string, tinfoil, or the throat of a herring are some of the lures in common use. Some fishermen attach a tiny silvery spinner or spoon, pearly button, or other shiny object to the fishing line within 6 inches to two feet of the baited hook

in order to attract the herring. Some anglers prefer to use spinners only during the spring and autumn fisheries, others use them at all times, still others depend only on the baited hook.

While some fishermen "jig" while angling for herring (i.e., continuously raise and lower the bait by an upward-downward motion of the arm), others keep the baited hook more-or-less stationary. A number of experienced fishermen keep the bait still but at the same time "jig" a spoon or shiny object attached to a separate line. In the winter fishery where angling is carried out in 18 inches to 15 feet of water the bait can be seen in the water and is not allowed to rest on the bottom but is suspended from one to several feet above the bottom. Similarly, the bait is held some distance off the bottom when angling in deep water at other seasons. By using these techniques and equipment, competent anglers are able to catch from a few dozen to several hundred lake herring daily under ideal fishing conditions.

REGULATIONS

The method of capture for herring is restricted to angling in Lake Simcoe but there are no specific regulations on this method of fishing. The use of spears has been prohibited by law for several years and netting was outlawed over 50 years ago. Lake herring may be taken by angling at any season of the year without limitation on size or numbers and anglers may sell their catches if they so desire.

MANAGEMENT

The lake herring is a principal food of the lake trout of Lake Simcoe. It is eaten also by the pike, pickerel, perch and most warm-water sport fishes when their distributions overlap that of the herring. The herring fishery is of considerable recreational value and the lake herring is regarded as an excellent food species by many people.

The unrestricted angling which has been a feature of the sport fishery since its inception has been an excellent management policy as demonstrated by the thriving herring population which has prevailed through the history of the Lake Simcoe fishery. This policy should be continued and a greater harvest of lake herring encouraged.

Present angling pressure results in only a modest harvest of the lake herring in comparison to the high annual production. The harvest may be increased substantially with no noticeable effect, either good or bad, on the future fishery. If the herring production is to be utilized rather than wasted, the recreational fishery should be expanded and resident fishermen should continue to capture by angling as many herring for local sale as the market can use efficiently.

During the history of the fishery there have been apparent fluctuations in the herring population and local mortalities of this species in the spring warm-up periods. The phenomena, which result from natural ecological conditions, may be expected to re-occur in the future fishery but are not cause for concern and cannot be prevented by any restrictions on the lake herring fishery.

(2) THE TROUT HERRING

The fish known locally as the "trout herring" is a small slender ciscoe, reaching 8 or 9 inches in length, which resembles closely the bloater, *Leucichthys hoyi*, of the Great Lakes in appearance and habits. It appears to share those waters preferred by the lake trout at most times of the year where it moves about in large schools. Winter fishermen observe the trout herring swimming in schools beneath the ice and the fish has derived its name from an association with the lake trout during the winter fishery.

The trout herring is taken only rarely, if ever, by angling and specimens taken in gill-net sets were of interest to fishermen who had previously seen them only swimming in the water. The trout herring inhabits the cool waters during the summer months and then is found in the deepest parts of the lake.

The trout herring contributes to the sport fishery only as food for other fishes and has been able to thrive under natural predation. No management is required.

THE LAKE TROUT

Lake Simcoe has been famed for its lake trout fishery since early visitors and settlers to the lake related the peculiar methods by which the Ojibway Indians captured quantities of excellent lake trout, *Salvelinus namaycush*, or "salmon-trout" as they were usually known. The Huron Indians called them *Ahouyoche*.



Figure 16—Conservation Officer inspects a catch of four lake trout by a local angler.

The Indians confined their serious lake trout fishing to the period from October to March. There was some activity in April and May, but no summer lake trout fishery. While gill nets were employed occasionally, the Ojibways apparently depended primarily on their ability with the spear for the capture of the lake trout which made up so great a part of their food. These trout were eaten fresh, or preserved for future use by salting, smoking, pickling, or freezing.

The abundance of lake trout on the spawning shoals during October provided the Indians with an opportunity to obtain food necessary for the coming winter as lake trout could be speared readily during the long autumn evenings, if calm weather prevailed. Typically, the canoe was paddled at the stern, often by a squaw, while the spearer stood poised in the bow awaiting the appearance of a fish in the clear water below. The spear was usually two or three-pronged with a white ash handle some 12 to 15 feet in length. A torch of birch bark was held in the split end of a slender pole, five or six feet long, attached to the bow of the boat (Magrath, 1833). The blazing bark, overhanging the water so lit it up that fish and objects on the bottom could be seen for a depth up to 10 feet. With this equipment, the Indian captured lake trout most effectively.

The Indian practice of night-spearing soon became recognized as an exciting sport by the white men who imitated the techniques used by the natives. As early as 1815, (Bond, 1838) described a rather unsuccessful spearing effort. The white men gradually became proficient in the act of night-spearing and improvised slightly on that equipment used by the Indians. For example, the birch bark flare which needed constant care, was replaced by an "iron-jack". This was a circular grate, about one foot in depth and 14 inches in diameter, into which eight inch lengths of pitch pine were fed in order to keep up a bright and continuous flame which blazed upward from two to three feet. The jack was appended to a pole at the bow of the boat by means of a socket which kept the fire pot level even in rough weather.

The Indian winter lake trout fishery was also a worthwhile source of food. An Indian huddling beneath a blanket and sitting over a hole in the ice was a common sight to the early white men. Lake trout were attracted within range of the spear by a small hook baited with a grub taken from the inside of pine bark, or by a wooden decoy attached to a handline which, when properly manipulated, imitated closely the actions of a small fish. The more hardy white men took up this practice of winter spearing and portable shelters soon replaced the Indian blanket which served two purposes: firstly, to protect the fishermen from the bitter winds and cold; secondly, to darken the hole so that the fish could be seen in the water below.

The ease with which gill nets could capture large numbers of lake trout at certain times of the year appealed to the white man and a rather extensive gill net fishery soon developed. In 1868, when commercial returns were first made for the lake, the sale of only some 1,000 pounds of lake trout was listed for Lake Simcoe and in the following year 11,000 pounds were reported. However, the quantities of lake trout appearing in the annual returns must be considered to be only a fraction of the amount of lake trout actually taken each year. The total number of trout taken for export, local sale, and personal use by uncontrolled gill netting, spearing, and spring and autumn angling must have been indeed great in these early years of the fishery.



Figure 17—Commercial fishing returns for lake trout in Lake Simcoe.

Between 1868 and 1940, the commercial sale of 1,700,000 pounds of lake trout was reported from Lake Simcoe waters (see Figure 17). This commercial trout fishery falls into two parts, separated by a decade of low returns between 1900 and 1910. The larger commercial catch of 1,200,000 pounds in the earlier period reflects the unrestricted use of any type of gear, particularly gill nets which were legal until late in the period. The considerable annual fluctuations in this earlier period would seem to represent varying fishing pressure, determined largely by the suitability of autumn weather conditions for effective netting and spearing, rather than significant changes in the trout population.

During the 1900-1910 decade, drastic restrictions were imposed on the capture of lake trout. All fishing methods, other than angling for personal use which was, by then, considered excellent sport, were forbidden. The native Indians, concentrated on Georgina and Snake Islands, were excluded from these fishing restrictions provided that the fish were not sold. While no trout were reported to have been sold during the time of maximum restrictions (1903 to 1906), there is no indication that there was any noticeable reduction in fishing activity. Illegal netting and spearing was difficult to control by ineffective law enforcement. By 1907, local agitation had resulted in the issuance of a few winter spearing licences for the taking of lake trout and whitefish. This again allowed the sale of lake trout from January through March.

After 1907, the number of winter spearing licences gradually increased to well over 100 in the 1920's. Between 1907 and 1940-41, when the spearing licence was abolished, the sale of nearly 500,000 pounds of lake trout was reported. This catch was made up only of those trout which licensed fishermen sold during the winter months. Senior residents around the lake reported that illegal autumn spearing and netting, and winter spearing captured trout in such quantities that they were carried away by the bagful or, during the winter, were piled on sleighs like cordwood. Winter fishing was done commonly from fishing huts. The more ardent fishermen, however, often moved about the lake following the movement of trout and fished through open holes.

Autumn spearing, while illegal, was practised enthusiastically with much the same type of equipment as was used 100 years before. However, the source of light was seldom a birch torch, or an "iron-jack". A common type of equipment consisted of a gallon oil tin with its pointed top turned downward to join a gas pipe which came to a "t" which was rapped in sheet asbestos. On turning a tap, the asbestos became saturated with oil which was readily ignited and gave an abundance of light. It is of interest that there was no legislation to prevent the possession of lake trout during the spawning season in October until 1918. In previous years, the closed season had been set erroneously in November.

In the early years of the fishery, neither Indian nor white man pursued the lake trout during the summer, although trolling was a popular way of fishing in the spring and autumn months. Once the lake trout had moved into deeper water about mid-May, it was lost to the fisherman until its re-appearance prior to the spawning season. It was not until about 1900 that the "Big Hole" was located at the north end of the lake and became extensively and successfully fished during the summer months. This was considered to be quite a risky venture in canoes and rowboats at the time. After that time, the summer fishery gradually expanded to other deep areas in the open lake with depths commonly 70 feet, or more. The appearance of motor-powered boats early in this century greatly increased the interest in the summer fishery.

After 1940, the lake trout assumed its present status in Lake Simcoe—that of a pure game fish which gave a recreational fishery extending over all four seasons of the year, excepting the month of October. Poaching has been drastically curtailed to the probable netting of small numbers of trout on the spawning beds, and the illegal sale of some trout taken by the legal angling of resident fishermen during the winter months. While the quality of fishing has varied from season to season and from year to year, the population of lake trout has remained at a high level. It has continued to provide excellent fishing for qualified fishermen, although the number of summer lake trout fishermen is estimated to have increased at least five times during the past 10 years.

It is of interest that small numbers of lake trout are taken by anglers who cast from wharfs and the shore during early spring and late autumn. For example, over 30 trout were taken by this method in Kempenfeldt Bay during the spring of 1950. Evidences of the success of summer fishermen are numerous. For example, one weekend fisherman captured an average of 44 lake trout each year during the three-year period 1950-52. Similarly, another fisherman who trolled an average of 35 part-days for each of the same three years averaged 41

trout annually. Several local sport fishermen reported seasonal catches of between 50 and 80 lake trout each. The individual catches of several professional guides average 250-500 lake trout annually.

On the basis of rather scattered anglers' fishing returns, it would seem that the better spring-summer-fall lake trout fishermen catch by trolling, on the average, one lake trout per 1.5 to 2 hours of intensive fishing. Many fishermen catch a great deal less. Some would-be lake trout fishermen, lacking the required perseverance, experience, and skill, may go fishless for an entire season. Although an accurate estimate of the number of lake trout taken from April through September has been prevented by complicating factors, incomplete data would indicate that upwards of 5,000 lake trout are taken annually from the lake by trolling.

The lake trout winter ice fishery is carried out from fishing huts distributed about several locations on the deeper part of the lake, particularly off Jackson's Point, Brechin, and Hawkestone. These fishing grounds are located several miles from shore. While a few fishermen use propellor-driven snowmobiles for transportation to the fishing grounds, the majority travel by older-styled automobiles when ice and snow conditions permit. At other times, they must walk. Snowshoes are sometimes used on heavy snow, and ice creepers on glare ice. Deep snow frequently makes the transport of fishing huts laborious. The lake trout are commonly taken on hooked decoys (see Figure 18), while live minnows and spoons are used successfully. Although these trout are commonly taken in 60-80 feet of water, some are taken near the surface or while angling for whitefish in shallower water. A few trout are taken occasionally in the shallow Cook's Bay area each winter.



Figure 18—Hooked decoys used in the winter lake trout fishery.

Most of the lake trout taken from Lake Simcoe during the winter are caught by local fishermen from the nearby towns and rural areas. There are several small groups of resident fishermen who devote the winter to the fishing of lake trout. These men, who fish almost daily during the time when ice conditions are safe, are very expert fishermen and it is not uncommon for individuals to catch their daily limit of five lake trout by mid-afternoon. A typical day's catch by one fisherman is shown in Figure 10. During a good winter, these fishermen may take between 100 and 250 lake trout each. The trout usually are disposed of locally.

A number of other local anglers, being accomplished trout fishermen, catch smaller numbers of trout during occasional fishing trips. Although several men report annual winter catches of up to 30 lake trout during the past three or four years, the average man fished only enough to catch a few fish for the family table.

Of those winter visitors who come to Lake Simcoe for recreational fishing, only a few are concerned with the lake trout fishery. The location of the winter trout grounds is perhaps the greatest deterrent to these fishermen who have neither the time nor energy to spend in a long, and often difficult, walk across the ice. When the ice is suitable for automobile travel, properly located fishing huts are scarce and few tourist fishermen are prepared to transport private huts for so great a distance. While it is true that a few capable tourist anglers capture a number of lake trout each year, it is probable that more lake trout are taken accidentally by whitefish fishermen than by tourist trout fishermen. The total quantity of lake trout taken each winter by all tourist fishermen is minute when compared to that taken by resident fishermen.

The early interest in the lake trout fishery decreed that Lake Simcoe receive its first planting of hatchery lake trout in 1880 when 40,000 fry and fingerlings were sent from the fish hatchery at Newcastle. Several more plantings were made during the next 40 years. Since 1925, annual plantings have been the rule (see Table IV). While fry and fingerling fish have been commonly planted, the policy of planting as many yearling fish as possible was begun in 1943. Lake Simcoe has been stocked with a total of 3,449,500 fry and fingerlings and 38,410 yearling lake trout between 1880 and 1955. In 1952, 1953, 1954 and 1955 over a half-million lake trout eggs were collected from Lake Simcoe for hatchery purposes in each October. The distribution of lake trout by aircraft was initiated in 1955 and proved very satisfactory.

LIFE HISTORY

Seasonal Distribution: The lake trout approach the shoal areas of the lake in early October when the surface water becomes cooler and congregate along the gravel or stony shores of the islands and mainland. These fish move nocturnally along the shoals usually in less than 20 feet of water until the advent of the spawning period. The young as well as the mature trout move into these areas although only fish of several pounds weight commonly appear in the selective fishing gear of hatchery trap nets or poachers' gill nets.

TABLE IV
PLANTINGS OF LAKE TROUT IN LAKE SIMCOE

YEAR	No. of Fry and Fingerlings	YEAR	No. of Fry and Fingerlings	No of Yearlings
1880	40,000	1937	50,000	.....
1887	100,000	1938	60,000	.....
1889	100,000	1939	60,000	.....
1914	100,000	1940	55,000	.....
1918	140,000	1941	75,000	.....
1919	210,000	1942	82,500	.....
1920	210,000	1943	30,000	1,860
1925	150,000	1944	.....	800
1926	565,000	1945	45,000	6,000
1927	25,000	1946	19,000	8,500
1929	120,000	1947	33,000	5,750
1930	110,000	1949	50,000	4,500
1931	60,000	1950	11,000	.....
1934	100,000	1951	29,000	.....
		1952	50,000	3,000
1935	100,000	1953	170,000	.....
1936	34,000	1954	240,000	8,000
		1955	216,000	.....
		Total	3,449,500	38,410

Following spawning in mid-October, the lake trout become widely distributed through the lake where they remain dispersed at various depths from the surface to over 75 feet of water and may occupy shallower areas of the lake, such as Cook's Bay, where warm water temperatures would prevent their presence during the summer months. After the formation of ice, the trout continue to roam about the lake and are captured infrequently by anglers on whitefish, herring, perch, and pike grounds. However, the greater number of lake trout frequent the open lake where trout fishermen angle in moderate depths of about 45 to 75 feet at various off-shore locations. The availability of food would seem to determine the movement and distribution of lake trout at this season of the year.

After the ice covering leaves the lake in late March or early April, the lake trout remain widely distributed in the lake where they are taken most frequently by anglers trolling in up to about 40 feet of water. The warming of the surface water to 50-55 degrees F. gradually drives the lake trout population into deeper water. This movement of trout occurs usually in late May or early June when they inhabit those shoal areas of moderate depth.

During the summer months, the distribution of the trout becomes limited to the deeper cooler water below the thermocline at depths of 70 to 100 feet or more. Many competent fishermen consider trout fishing to be at its best during July, August, and early September when the lake trout are concentrated in the deep basins of the lake. The cooling of the upper layers of water in late September or early October again allows the mass movement of the lake trout into shallower water.

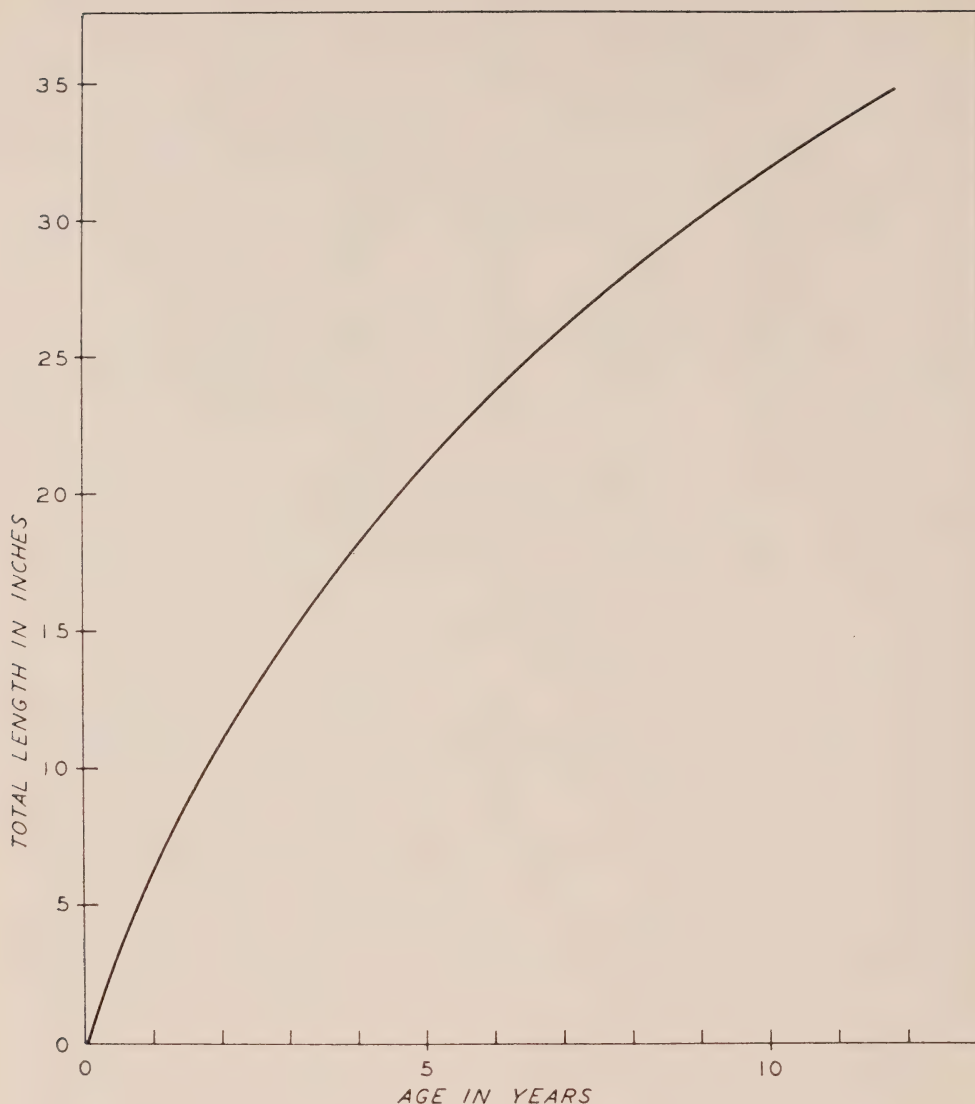


Figure 19—Growth curve of Lake Simcoe lake trout.

Age Growth: The lake trout of Lake Simcoe are of excellent quality and have a growth rate which is seldom equalled by the trout of other Ontario inland waters. The age-length relationship for the trout population sampled between 1952 and 1953 is given in Figure 19.

These lake trout first mature in their 6th year at which time they have attained a total length of 24 to 25 inches and a weight of 4 to 4½ pounds. Trout between 6 and 8 years of age (5 to 8 pounds) dominate the spawning population and the fishery. Larger trout appear less frequently on the spawning shoals

or in the anglers' catches and these are seldom over 11 years of age (33-35 inches, 15-16 pounds). The largest known record is that of a 28-pound lake trout taken in 1909. A greater number of small trout from 2 to 5 years of age were taken by trolling with standard lures during the summer of 1954 than in recent preceding years.

Breeding Habits: The mature lake trout which begin to appear on the shoal areas of the lake in early October usually commence spawning shortly after the 15th of October. The length of spawning period may extend from 4 to 5 days to about 2 weeks. Heavy onshore winds and rough water generally result in a short spawning period whereas calm weather allows spawning over a more prolonged period. Water temperatures during the spawning period in 1954 stayed between 54 and 57 deg. F. but in colder autumns may drop to 48°F. or lower.

The spawning occurs on the extensive areas of sonte (baseball and larger size) and small boulders which characterize a considerable portion of the shoreline of the lake. Spawning occurs from the shore outward into water of 12 feet or more in depth. The fertilized eggs fall into the protective interstices on the bottom where they are left unattended during the long incubation period that follows. The mature 6-8 year-old female fish which dominate the spawning population produce an average of 3000 to 3500 eggs per fish which hatch as the water temperature rises in the following spring. Following spawning, the trout disperse from these shoal areas.

FOOD

The lake trout in Lake Simcoe are primarily carnivorous, feeding practically entirely on other live fish. The freshwater herring provides a high percentage of the food supply at all seasons of the year while whitefish and lake shiners are eaten frequently. Many winter fishermen are familiar with the appearance of lake trout in pursuit of large schools of "trout herring" travelling but a short distance below the surface of the ice. These "trout herring", named for this association with the lake trout, are preyed upon to about the same extent as the blueback herring by the lake trout. Perch, suckers, minnows, warm water fish, and aquatic insects are frequent items of food when their seasonal distribution overlaps that of the lake trout. The movement and distribution of the lake trout beneath the thermocline during the summer months and over the whole lake at other seasons appears to be closely associated with that of their preferred food fish.

ANGLING

The lake trout are taken more-or-less exclusively by trolling from slow-moving boats except during the winter season when the lake is covered by ice. The most effective baits are those of the spinner or wobbler type which are trolled behind the boat on metal lines which cause the baits to drop to the lake bottom where a high proportion of the trout are taken at various depths, depending on the time of the year. In the spring and autumn, lake trout are taken occasionally by fishermen casting spoons or plugs from shore or still-fishing with live minnows.

During the winter, ice fishermen fish through the ice with live minnows or, more frequently, with hooked decoys. A few lake trout are taken each year on whitefish and herring lures.

REGULATIONS

The gradual change in the lake trout fishery from an unregulated commercial and sport fishery to an exclusive and highly regulated sport fishery has been outlined in the introductory history. This evolution of the fishery involved principally the abolition of legal netting about the turn of the century and the end of legalized winter spearing only a little over a decade ago which finally reserved the lake trout solely for the angler.

A closed season was first imposed on the lake trout fishery as early as 1889 when fishing was prohibited from November 1st to November 30th in order to protect the spawning lake trout. Although this closed season failed to coincide with the spawning season and was of no value, it was continued until 1918 when it was changed to the period of October 5th to November 5th which was satisfactory. However, the season was again changed to the period of October 25th to November 15th which covered only the latter part of the spawning time. In 1934, it was advanced further to October 5th with the closure ending on October 31st. Although the closed season reverted to October 15th–November 15th during the early 1940's, it has since 1946 been set as the period from October 6th to November 5th which adequately covers the time of lake trout spawning in most years. A legal daily possession limit of 3 lake trout was imposed in 1918 but changed three years later to 5 trout per day. The daily limit has remained unchanged since that time although recently the possession limit has been reduced from two to one day's legal catch.

MANAGEMENT

The lake trout population of Lake Simcoe requires limited but definite management. The excellent habitat conditions coupled with an abundance of natural food have produced fast-growing and well-conditioned trout which are available to the competent angler. The extensive areas of fine spawning beds have maintained a substantial population of lake trout through the years even when subjected to an early commercial fishery which is known to have removed in excess of 1½ million pounds of trout. This is in addition to the tremendous quantities taken by unreported angling, spearing, and netting through the years.

The present daily creel limit of 5 lake trout per day, representing a weight of fish considerably in excess of the normal requirements of most fishermen, has been a matter for discussion among sportsmen. A survey has shown that the majority of people favour a reduction in the limit to perhaps two trout per day in order to prevent the possibility of over-exploitation of the lake trout population by intensive angling particularly during the winter months. Although it is questionable that a reduced limit would increase significantly the angling success of the poor or mediocre fishermen, it may be expected to result in a more effective control over the sale of trout during the winter fishery when daily creel limits can be taken with regularity by some skilled fishermen. Any reduction in creel limits should apply to both the open-water and ice fishery.

A length limit on lake trout in Lake Simcoe is unnecessary and, at any rate, only larger trout are taken commonly on the selective trout baits.

The closed season on lake trout fishing between October 6th and November 5th adequately covers that period during which the trout are on the spawning grounds. Although this legislation is aimed at the protection of the trout from unethical anglers while the fish are concentrated on the shoals, the fact that it makes illegal the possession of lake trout about the lake is of particular value in curtailing illegal netting and spearing which can remove spectacular quantities of trout in a single night of fishing. The protection of the lake trout while on the spawning grounds is the most important of present management practices but constitutes a difficult task for the small group of conservation officers who patrol Lake Simcoe. More rigid law enforcement followed by heavy penalties to violators is necessary if illegal activities are to be adequately controlled in order that the trout may reproduce naturally and be reserved for the sport fishermen.

Lake Simcoe has been stocked with fry, fingerling, and yearling lake trout almost annually for many years although the value to the fishery has not been demonstrated. As these plantings of hatchery fish have failed to prevent the considerable fluctuations in fishing quality which have occurred in the past, further plantings cannot be expected to prevent future variations in angling success which may, or may not, represent actual population changes. In view of the extensive excellent spawning grounds and the substantial population of lake trout, the value of a restocking programme is questionable.

The annual production of lake trout in Lake Simcoe should be harvested and it would appear that the average yearly catch, estimated at 25,000 to 50,000 pounds, may be exceeded without threat to the future welfare of the fishery. There is no suggestion that this lake trout population can be overfished by legalized angling without unprecedented changes in environmental conditions.

THE RAINBOW TROUT

The rainbow or steelhead trout, *Salmo gairdnerii*, was first introduced into Lake Simcoe waters in 1918 with the planting of 140,000 fry and fingerlings on the west side of the lake (Table V). Since that time, nearly 1,500,000 fry-fingerlings and 37,000 yearling trout have been stocked in Lake Simcoe and its better tributary creeks along the west shore. As a result of these plantings, rainbow trout have become established. Although they have continued to increase noticeably in numbers, the rainbow trout has been of comparatively little value to the sport fishery.

TABLE V
PLANTINGS OF RAINBOW TROUT IN LAKE SIMCOE

YEAR	Number of Fry and Fingerlings	Number of Yearlings
1918.....	140,000	.....
1921.....	900,000	.....
1922.....	6,500	.....
1930.....	24,500	10,000
1931.....	128,000	10,920
1932.....	91,400	.....
1934.....	6,000	6,734
1935.....	13,000	.....
1936.....	5,000	1,740
1937.....	7,000	.....
1938.....	40,000	3,000
1940.....	.....	3,000
1942.....	.....	1,800
Total.....	1,361,400	37,194

Following the plantings of 1918-1922, a few specimens were taken near Orillia, the largest authentic capture being a five-pound fish taken in 1924. It was not until nearly 1930 that rainbow trout were observed in early spring around the river mouths on the west shore of the lake. These fish were small, one to three pounds in weight. Between August 14, 1930, and June 2nd, 1934, Brough's Creek was closed for rainbow trout propagation by an Order-in-Council. The appearance of a few large trout, weighing from three to ten pounds, was a matter of interest by 1936. In the following years, rainbow trout were observed more frequently during the spring and autumn months but were captured only infrequently. Although no hatchery plantings have been made since 1942, the population of rainbow trout in the lake has continued to increase slowly to its present level through natural reproduction.

In the spring and autumn months the rainbow trout population of the lake becomes concentrated more-or-less on the west shore from Brough's Creek southward around Kempenfeldt Bay, where spawning occurs in suitable tributary creeks. Here there is a limited fishery. A few trout occasionally move into

several of the rivers on the north and east shores, particularly the Talbot, Beaver, Pepperlaw, and Sutton, where upstream movement is restricted by mill dams located near the lake. However, rainbow trout are seldom caught in these waters and are taken only accidentally by fishermen in quest of other species. The only records of rainbow trout in the Cook's Bay area have been the capture of two fish in the commercial carp seines about 1937.

During the summer months, an odd rainbow is caught in the open lake by fishermen trolling for lake trout. At that time of year, the lake trout frequent the deep water whereas those rainbow trout captured are taken nearer the surface on lake trout baits when the line is being reeled in or let out. On warm calm days, numbers of rainbow trout often can be seen jumping at the surface of the water above the summer lake trout grounds.

In the winter, rainbow trout have been taken very rarely through the ice on the freshwater herring grounds of Kempenfeldt Bay. Substantial numbers of young rainbow trout can be found only on the west shore of the lake where several of the tributary creeks offer ideal habitat conditions for the spawning and rearing of this species.

LIFE HISTORY

Distribution: Adult rainbow trout ascend suitable rivers and creeks of Lake Simcoe during the earliest spring freshets. Those tributaries of the west shore, particularly Brough's Creek and Tollendale Creek, enjoy modest runs of rainbow trout while the movement of trout up the Hawkestone Creek is restricted by the village dam. Although the rainbow trout population of the lake is more closely related to the creeks of the west shore and the Kempenfeldt Bay, Big Bay Point, and Hawkestone areas, each spring a few trout move up the Talbot, Beaverton, Pepperlaw, and Sutton rivers until obstructed by a dam in each case.

Following spring spawning in the streams, the parent fish move back into the lake and become distributed along the gravel and rubble shoreline. The young rainbow commonly remain in the creeks for two or three years before descending into the lake and are then 6 to 8 inches in length. During the summer, the trout frequent the open lake where they seem to be associated with the upper and warmer water and shoal areas of 25 to 30 feet in depth and can be observed occasionally while feeding at the surface although seldom entering the sport fishery.

Numbers of rainbow trout approach the shores of Kempenfeldt Bay and presumably elsewhere in the autumn and appear to remain near river mouths during the winter and are prepared to enter the creeks and rivers with the first spring floods.

Age and Growth: The young rainbow trout which hatch in late spring on the gravel spawning beds of the creeks and rivers grow to 3 or 4 inches by the first autumn. By the second autumn, they are 6 to 8 inches in length and move out into the lake usually the following spring. Once in the lake, as may be seen by the growth curve in Figure 20, the growth rate increases as an abundance of food becomes available. The trout may put on as much as 10 inches in length and increase from 2-3 ounces to over a pound in weight during the first year in

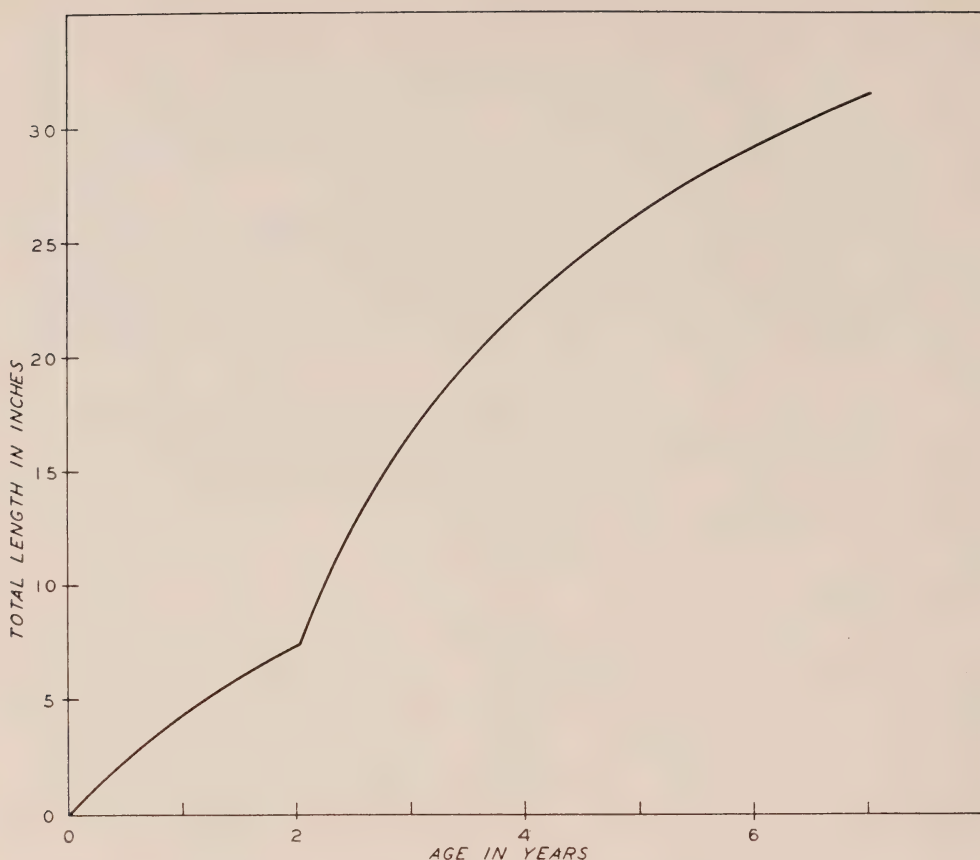


Figure 20—Growth curve of rainbow trout in Lake Simcoe.

the lake. The average size of rainbow trout taken by anglers is between three and eight pounds. The largest rainbow trout on record for Lake Simcoe was taken in Kempenfeldt Bay in November, 1952. It measured $31\frac{1}{2}$ inches in total length, 23 inches in girth, weighed $18\frac{1}{2}$ pounds, and was 7 years of age.

Breeding Habits: Spawning takes place in the clean gravel riffles of the streams in April and May. Adult trout which come up the rivers usually under flood conditions remain there until spawning is completed and then make their way back to the lake. The female trout may lay from 1000 to 3000 eggs which hatch in several weeks. No parental care is given to the young fry which find shelter on the gravel bottom and as they become larger adopt habitats in pools, around stones, boulders, logs, or undercut banks where they remain usually for two years before moving out into the lake. The most suitable spawning grounds and rearing areas lie in the small creeks of the west shore although the presence of dams in most of these limits spawning to the lower reaches. The larger rivers of the north and east shores are much less suitable for natural reproduction and survival of young fish. Rainbow trout become very silvery in colour while

in the lake and are commonly known as steelheads or occasionally mistaken for Atlantic salmon which were also planted in the lake. At spawning season, the adult fish develop the characteristic red streak on the side of the body.

FOOD

The young fish in the streams feed largely on the larvae and adults of aquatic insects and also terrestrial insects which float downstream in the current. Live fish are a preferred food although the limited quantities of minnows, suckers, and young brook trout in those areas frequented by the young rainbow trout can form only a small part of the diet in most streams.

On reaching the lake, the rainbow trout begin to feed heavily on an abundance of larger aquatic larval and adult insects and can be seen feeding near the surface on mayflies and other forms. Live fish are an important item of food and the principal species include the lake shiner and other minnows, the freshwater herring, the perch, the sucker, and the young of other fish. The rainbow trout are exceptionally well fed while in the lake and grow rapidly to become large fish of excellent quality.

ANGLING

The rainbow trout of Lake Simcoe are harvested only lightly by anglers. Adult fish have often left the streams by the opening of the trout season and, consequently, those trout taken there by angling are the young trout up to about 8 inches in length. They are taken on worms, spinners, and trout flies most commonly.

Except for a very small autumn fishery around Kempenfeldt Bay and Big Bay Point where a few rainbow trout are taken by spinning or casting from shore or docks with wobblers, spinners, or small plugs, most of the trout are taken accidentally during the summer while reeling in lake trout lures in the open lake or while angling for herring, whitefish, or perch with live minnows in shallow water at other seasons of the year.

REGULATIONS

Following the initial introduction of rainbow trout to Lake Simcoe in 1918, there was an annual closed season from September 15th to June 30th which covered amply the time during which the adult trout concentrate in the streams. The legal daily limit at that time was 6 fish with a fork length of 7 inches. In 1926, the closed season was shortened to June 1st instead of June 30th and the limit was lowered to 5 fish per day. In 1935, it was changed to include the period from September 16th to May 31st, and in 1946 the latter date was advanced to April 17th. From 1947 until the present time, the closed season has extended from September 16th to April 30th. Legislation of 1954 changed the method of measuring rainbow trout from fork to total length while retaining the 7-inch limit and reduced the legal catch from a two-day to a one-day catch of 5 fish.

The heavy plantings of the early 1930's were accompanied by a closure of Brough's Creek from August 14th, 1930, to June 2nd, 1934, in order to assist in the establishment of rainbow trout in Lake Simcoe waters.

In 1953, as the result of the requests of fishermen in the Kempenfeldt Bay area for an autumn rainbow trout fishery, the open season was extended to November 30th except for the period between October 6th and November 5th when there is a closed season on lake trout. The daily limit is reduced to 2 rainbow trout per day during the extended period.

MANAGEMENT

The rainbow trout which was introduced through plantings between 1918 and 1942 has continued to maintain itself by natural reproduction since the latter date. While the advisability of introducing rainbow trout to Lake Simcoe waters is most questionable in view of the excellent sport fishery for a variety of native fishes, the species has become firmly established in the lake but contributes very little, if anything, to the sport fishery. Except for the mild enthusiasm of a few Kempenfeldt Bay fishermen in the autumn which is rewarded with mediocre success (about 20 fish in the fall of 1953), lake fishermen have not shown sufficient interest in the rainbow trout to establish a sport fishery.

Adult rainbow trout require protection from anglers only during the spring spawning season when the fish are in the creeks and rivers and extremely vulnerable to over-exploitation. When these trout are in the lake, there is need for neither protection by closed seasons nor restrictions on the size or numbers which may be taken by angling.

Anglers have the option of fishing the young rainbow trout in the rearing creeks and rivers where they stay for about two years after hatching until 7 or 8 inches in length, or they can delay fishing until the trout have had the opportunity to grow to several pounds weight in the lake. Under present fishing pressure in the creeks, there would seem to be sufficient escapement of small fish into the lake to assure adequate mature fish for natural reproduction. However, the establishment of permanent fish sanctuaries in several of the creeks of the west shore may be effective management in future years if fishermen show sufficient interest in the rainbow trout and demonstrate the ability to harvest it in the lake.

ATLANTIC SALMON

In 1871, a few thousand young Atlantic Salmon, *Salmo salar*, were planted in the waters of Lake Simcoe with the hope that they would become established there. These fish were of Lake Ontario stock which had been reared at the Newcastle Hatchery. There are no authentic records of the recapture of any of these fish.

Further attempts to introduce salmon to Lake Simcoe were made in 1935 with the planting of 2,000 landlocked salmon yearlings, in 1940 with 13,950 fingerling Atlantic salmon, and in 1948 with the planting of 7,000 salmon of Miramichi stock in Brough's Creek.

There were quite reliable reports of the capture of a very few large salmon following the later plantings although no specimens have been identified by a taxonomist. At any rate, the present population of salmon, if any, does not contribute to the sport fishery and there is no concrete evidence of autumn natural reproduction in the streams. While the establishment of Atlantic salmon has a degree of public appeal, experienced Lake Simcoe fishermen generally agree that it is not needed in the recreational fishery.

For many years the Department of Game and Fisheries planted the lake trout under the old name "salmon trout". This latter name has continued to be applied to the lake trout by some of the senior fishermen and has caused confusion among other fishermen not familiar with the nomenclature.

THE WHITE SUCKER

HISTORY AND PRESENT STATUS

The white sucker, *Catostomus commersonnii*, is the common sucker of Lake Simcoe. Less common is the longnose sucker, *Catostomus catostomus*, which has a similar life history but inhabits deeper parts of the lake during the summer months.

Early settlers showed no interest in the sucker as a food or sport fish as shown by its description as a "worthless prize full of bones, and very watery" which appeared in *Forest Scenes* of 1838. On account of the readiness with which suckers could be captured by netting at certain times of the year, they contributed considerably to the commercial catches of coarse fish which did not become important until 1887 when the sale of 10,000 pounds was reported. A total commercial catch exceeding 1,700,000 pounds of mixed coarse fish was reported between 1887 and 1955, although the fishery has been more-or-less inactive for the past decade.

The sport fishery is insignificant and limited to the spring months when the suckers are in the rivers and creeks. Quantities of suckers are taken by fishermen using small dip nets, but the spearing of suckers has been curtailed by legislation outlawing the possession of spears in the vicinity of Lake Simcoe for the protection of certain sport fishes. Few suckers are taken by angling although simple fishing tackle can be used effectively in the streams. However, young suckers are an excellent live bait species and are used for the angling of sport fishes.

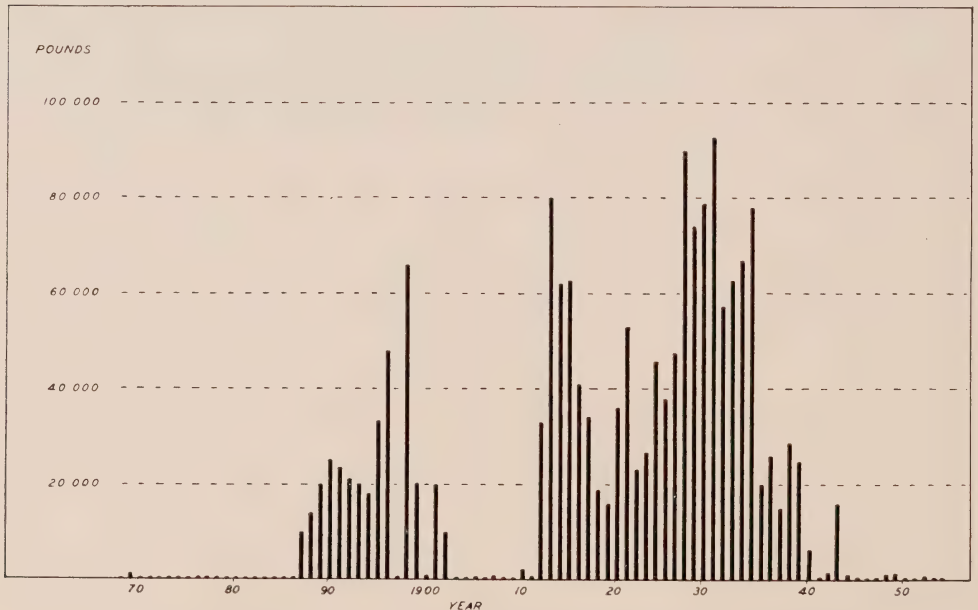


Figure 21—Commercial fishing returns for suckers in Lake Simcoe.

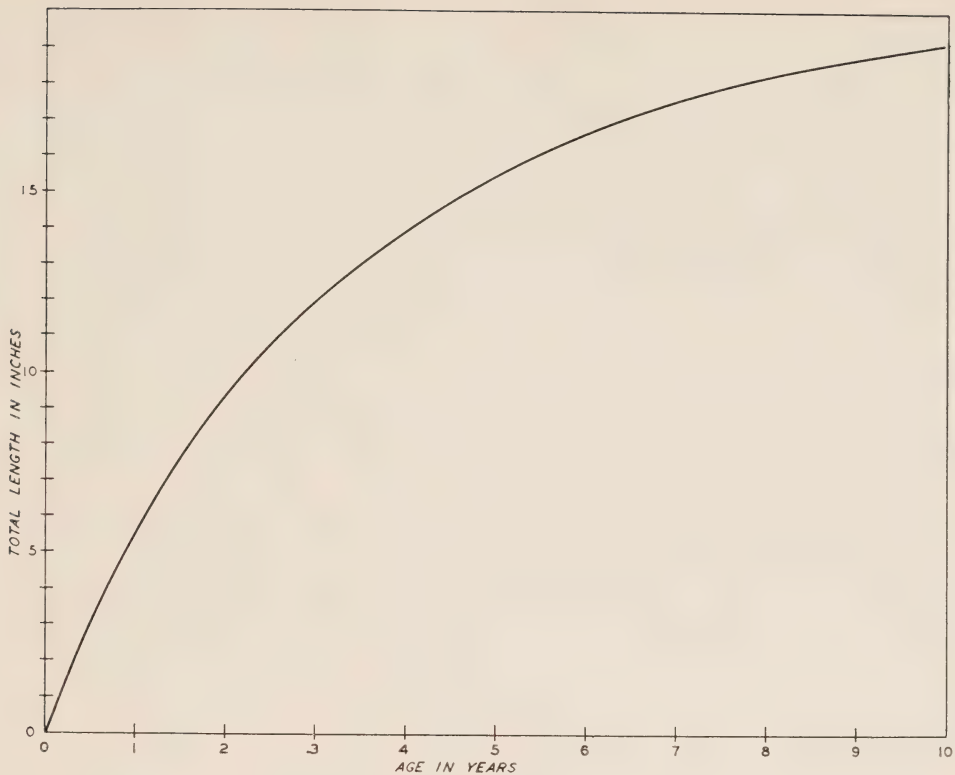


Figure 22—Growth curve of the white sucker in Lake Simcoe.

LIFE HISTORY

Distribution: The spring “runs” of suckers into the rivers and creeks of Lake Simcoe occur through April and May and may ascend to the headwaters unless obstructed by dams. After spawning, most of the suckers drop back to the lake where they frequent the shallower and warmer waters and appear to be most abundant at depths under 35 to 40 feet. The young fish inhabit the marginal shallows of the lake and tributary streams where they remain in large schools.

Age and Growth: The growth of young-of-the-year suckers approximates 3 to 5 inches the first year. At age 2 the fish are some 10 inches in length and weigh about $\frac{1}{3}$ pound. They reach weights of a pound by the fifth year. The largest white sucker studied was 10 years old, measured 19 inches and weighed over $2\frac{1}{2}$ pounds. The growth rate curve for the white sucker is given in Figure 22.

Breeding Habits: Many suckers run into the tributary streams of Lake Simcoe from late March through April and May although spawning does not take place until late in the period. The eggs are deposited over gravel and stony riffle areas, usually in a moderate current. No care is given to the eggs and

after spawning the parent fish move downstream into the deeper pools and gradually work their way back to the lake. No observations were made of white suckers spawning on the shoals of the lake but this is quite probable. As the female suckers of a pound in weight lay some 50-60,000 eggs, the reproductive potential of this species is high.

FOOD

The white sucker lives on a variety of bottom organisms and those stomachs examined contained mud, plant remains, aquatic insects, molluscs and crustaceans.

REGULATIONS

The sucker has been regarded always as an undesirable species and, consequently, the earliest commercial coarse fish licences permitted the unlimited capture of suckers by netting.

During the months of April and May, fishermen may still take suckers and other coarse fish during the daytime without the authority of a licence by means of a dip net which is not more than 6 feet square or in diameter. The spearing of suckers is prevented by a regulation prohibiting the possession of a spear near Lake Simcoe.

There are no specific regulations governing the angling of suckers.

MANAGEMENT

The suckers are a prolific but unexploited fish in Lake Simcoe water. Every encouragement should be given to commercial and sport fishermen to harvest the population.

THE CARP

The introduction of carp, *Cyprinus carpio*, into the waters of Lake Simcoe was of momentous consequence in the history of the fishery. Carp were first introduced into Lake Simcoe watershed late in the 19th century when several mill ponds on the upper branches of the Holland River were stocked with fish imported directly from Europe. It is believed that the first carp to escape into the lower Holland River followed the breaking of a dam at Dyke's Pond, near Newmarket, during a freshet in 1896.

Between the years 1896 and 1899, the carp apparently increased with amazing rapidity for the local fisheries overseer at Bradford stated that by 1899 great numbers of carp had made their appearance in the Holland River, the Schomberg River, and the marshy portions of Cook's Bay. A large proportion of those carp observed until after 1900 ranged between 6 inches and 18 inches in length. During the next four or five years, the local residents at the south end of the lake grew intensely interested in the carp and it became highly prized as food and considered to be somewhat of a delicacy. In these early years, the carp were usually taken by spears and could be sold readily to waiting buyers at prices up to \$1.00 each, many coming from Toronto in hope of purchasing fish.

However, the amiable welcome given to the appearance of carp was soon replaced by an attitude of contempt when the destructive characteristics of the carp became apparent. Even by 1902, the extensive beds of wild rice which flourished in the lower Holland River and Cook's Bay and which attracted an abundance of waterfowl were virtually destroyed. It was believed by many that the spawning beds of the maskinonge had been destroyed which caused this fish to move up the Holland River to spawn. Demands came from all sources to rid the lake of carp.

By 1909, the carp had extended their distribution up the west side of Lake Simcoe at least to Gilford and Painswick where they appeared in great numbers in the muddy bays. During the spring months, the marshes and marginal meadow lands were literally flooded with carp where they could be easily caught with the bare hands, or speared, or snared, or clubbed to death. Carp taken in this way were shipped commonly to the Toronto market.

The gradual movement of carp northward along the west shore of the lake apparently reached Kempenfeldt Bay previous to 1916 where they moved into the creek mouths. They were occasionally taken while fishing for perch in the bay. As the gravelly character of the shoreline of Big Bay Point and Kempenfeldt Bay offered only limited areas of suitable habitat, the carp concentrated in these areas and, while perhaps appearing numerous to the local people, the number of fish was actually insignificant in comparison to that of the Cook's Bay region.

The distribution of the carp northward from Cook's Bay up the east shore of Lake Simcoe was much slower than along the opposite shore. Carp did not appear to the north of Roches Point until about 1920 and were not reported in

the Pefferlaw River until 1925. After this time, their numbers seemed to increase quickly in the few rivers on the east shore of the lake. However, only very restricted parts of the shoreline provided suitable environmental conditions for carp. Apparently the first indications that carp were invading this shore of the lake came from fishermen who captured a few of this species while bait fishing for smallmouth bass.

The appearance of carp in the bays along the north shore of Lake Simcoe as early as 1902-05 does not seem to fit into the pattern of carp distribution which radiated from the Holland River. Rather, the presence of carp in the Brechin-Uptergrove-Atherley area at so early a date would appear to be related to the introduction of carp into Lake St. George, immediately north of Lake Simcoe, shortly after 1900. Once present on the north shore, the carp multiplied rapidly in Smith's Bay and the other muddy bays. As in Cook's Bay, the beds of wild rice were virtually destroyed and the carp soon received public condemnation.

In spite of the agitation of local people for the riddance of carp by any means, it was not until 1909 that a commercial seine licence was first issued for the taking of this species. The first reported commercial catch of only 1,000 pounds of carp in 1910 is known to have been only a pittance of the quantity of carp taken in other ways in that year and in previous years. During 1911, the activities of fishermen employing two 400-yard seines resulted in the capture of 462,406 pounds. The commercial catches in the years which followed are given in Figure 23. Unfortunately, there is no way of ascertaining the numbers of carp harvested by spears and other devices in Lake Simcoe in that year. It is reported that one group of fishermen seined 54 tons of carp in one haul of the seine. These fish were shipped f.o.b. to New York and brought 30 to 35c per pound.

About 1911, the presence of some "mirror" or "leather" carp was noted and these fish were believed to be of superior quality and flavour to the ordinary carp. The "mirror" carp is a genetic variant of the normal carp and forms a small percentage of any normal carp population. It varies from common carp only in that the number of scales on its body are fewer and leave portions of the body naked of scales. A few very large scales are usually present which gives the fish a peculiar appearance. The particular interest in the "mirror" carp proved to be only a fad and was apparently soon forgotten. In 1912, the reported catch of carp from Lake Simcoe dropped to 123,871 pounds. During that year, the water level of the lake remained low all spring and the lowlands, where the carp normally congregated, did not flood. As a result, the number of carp taken by seining was considerably lower than in the previous year. Again in 1913, the spring carp run was short in the Holland River and Cook's Bay, although carp were plentiful around the Narrows at Atherley and contributed considerably to the 116,262 pounds taken in the lake during the autumn and through the ice in the winter. It is not believed that the lower returns represented any significant reduction in the actual population of carp.

In the years that followed, one can only speculate whether or not the fluctuation in annual catches was the result of population changes or variations in fishing effort. At any rate, the annual take did not fall below the 84,452

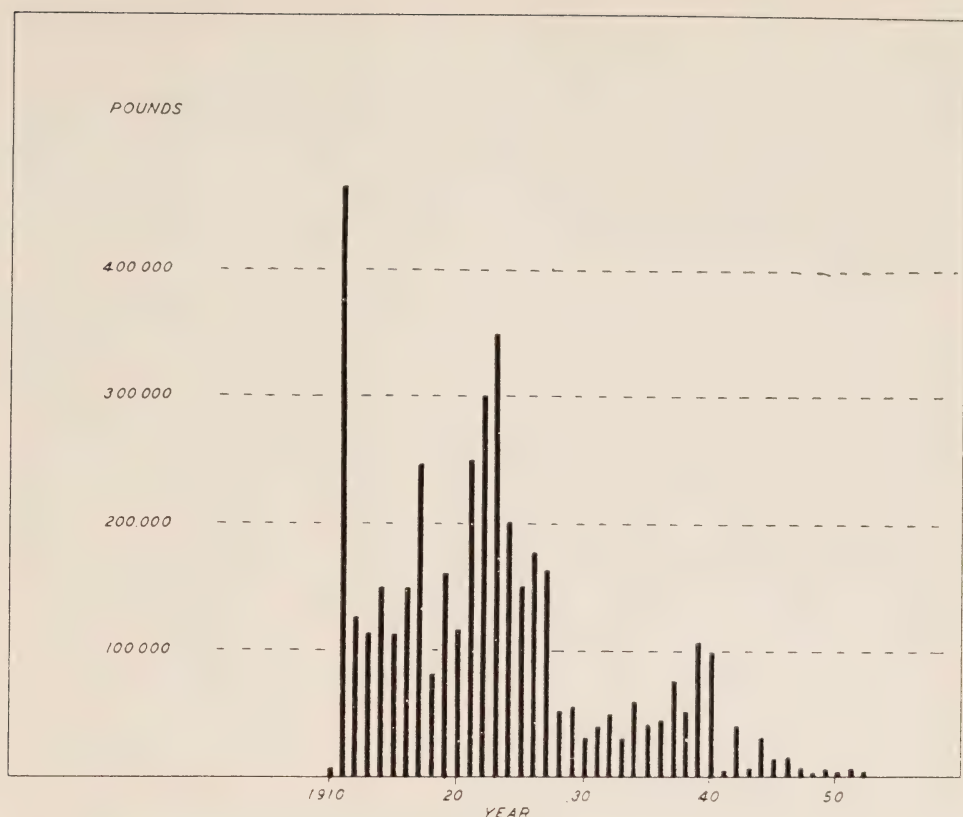


Figure 23—Commercial fishing returns for carp in Lake Simcoe.

pounds taken in 1918, and reached a peak of 347,409 pounds in 1923. After 1923, the quantity of carp taken diminished each year until by 1928 it had dropped to 49,124 pounds. It is of interest that in 1923 the first drainage scheme at the south end of the Holland Marsh was completed which made a considerable part of the original spawning grounds of the carp no longer available to them. A large number of carp trapped within the drained area was seined through the ice in December of that year.

In the summer of 1928, there occurred a heavy mortality among the carp of the lake. As die-offs of fish are usually greatly exaggerated, the damage done to the carp population cannot be pictured clearly. However, it is known that in certain areas it was necessary for local authorities to truck away quantities of dead fish which accumulated along the shore. Neither the cause of the epidemic nor the extent of the kill was ever determined.

The correlation between the die-off of carp and the drop of over 100,000 pounds in the annual catch between 1927 and 1928 is of interest although its significance is questionable. A study of the previous annual fluctuations in the catches of carp has shown that the quantity of fish taken may have been

more directly related to suitable water levels and the availability of carp than to the actual population of this fish in the lake. However, local people reported that a sizeable population of carp remained alive after the mortality was over, a belief which was substantiated by the commercial returns in the following years. The quantity of carp taken annually between 1928 and 1938 failed to increase or decrease appreciably from the 1928 level, approximating 50,000 pounds each year. The winter carp fishing in Cook's Bay continued to be profitable for quantities of carp were seined in a deep hole each year soon after the formation of good ice.

Although commercial catches of carp increased to about 100,000 pounds in each of the years of 1939 and 1940, the trend in the fishery has been downward from a peak of about 350,000 pounds in 1928 to a low in 1950-52. This trend in the commercial returns would seem to simulate a corresponding decrease in the carp population. During the 1940's, carp more-or-less disappeared from those parts of the lake not ideally suited for their welfare, particularly Kempenfeldt Bay and some 90% of the shoreline of the lake which has sand, gravel, or stone beaches. The remaining area, restricted to Cook's Bay and other muddy bays and river mouths around the lake, has continued to support a relatively low population of carp which has not been actively exploited in recent years. A mediocre market contributed towards a lack of interest in the fishery and the failure of commercial fishermen to fish during 1950 and 1952. Limited operations off Thorah Island seined only 3000 pounds of carp during 1953. The number of commercial fishing licences issued for Lake Simcoe now covers only three seines and four dip nets.

The introduction of carp to the waters of Lake Simcoe contributed to a commercial fishery which reported a harvest of 4,000,000 pounds of carp, from the lake between 1910 and 1953. The amount of unreported fish captured by residents and others cannot be estimated. The reported catch of carp has dominated the commercial fishery since 1910 and has composed some 40% of the total commercial returns for all species from Lake Simcoe since fisheries statistics were first compiled in 1868.

LIFE HISTORY

Distribution: The carp is a warm water species which remains more-or-less in the weedy areas of the lake and river mouths at all seasons of the year. The most extensive habitat suitable to carp is the Cook's Bay area. Less extensive weedy areas are scattered along the eastern and northern shore of the lake.

After spawning among the vegetation of the muddy shallows, the carp become distributed through the regions of heavier plant growth where the water may be 8-10 feet or more in depth. During the winter months, numbers of carp move into the deeper holes of Cook's Bay where they may be captured by seining beneath the ice. Others appear to hibernate on the bottom of the various muddy bays of the lake until the advent of warm spring weather when they again move into the shallows of the spawning areas.

Age and Growth: The average growth rate of the carp of the Cook's Bay region are shown in Figure 24. The young carp reach a length of 3-6 inches by the end of the first growing season. By maturity in the third or fourth

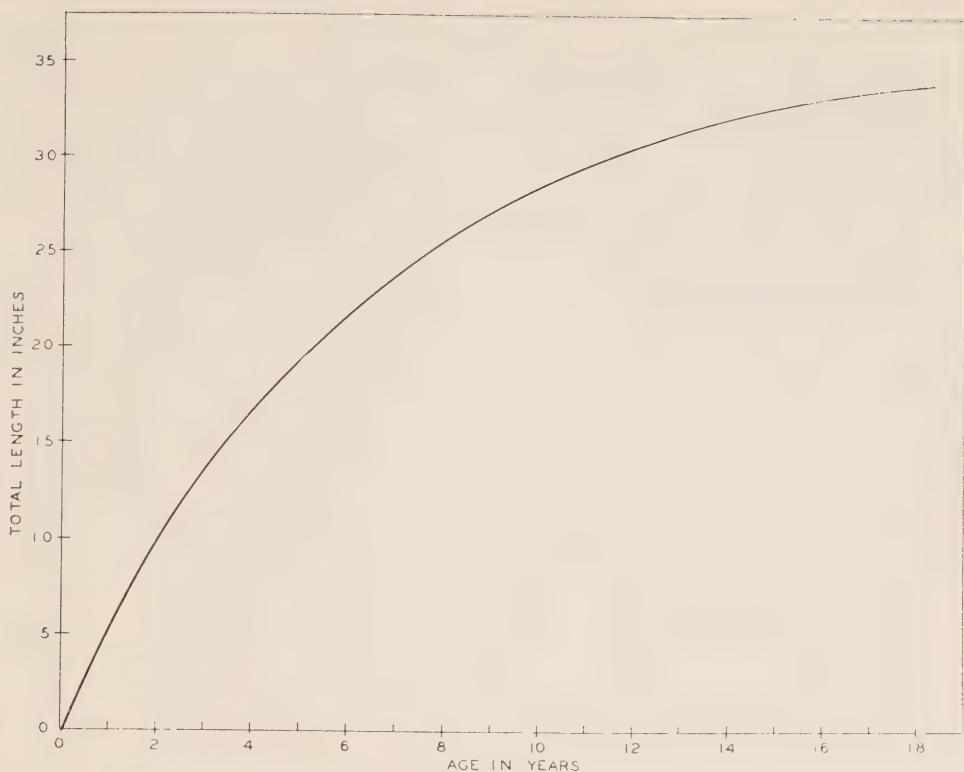


Figure 24—Growth curve of carp in Lake Simcoe.

year of life, the fish average from 12 to 18 inches in length and have attained weights of from three to five pounds. Lengths of 25-30 inches and weights 15-19 pounds are common by the 10th year. Above this age, the carp grow more slowly to lengths of 30-36 inches while increasing considerably in weight. The largest fish aged weighed about 34 pounds at the age of 17 years.

Breeding Habits: The carp spawn in the Holland Marsh, in Cook's Bay, in the lower sluggish areas of the larger rivers, and in the other weedy bays of the lake during May and June. Spawning takes place commonly in from one to three feet of water, where, on warm days, the schools of carp create a disturbance with their noisy splashings. The fish mature in three to four years at lengths approximating 15 to 20 inches.

The eggs are adhesive and, when scattered over the aquatic vegetation, adhere to the plant surfaces. Annual egg production ranges from about 100,000 in 4-5 pound carp to over 2,000,000 in 20-25 pound females. These eggs are deposited over a period of several days in lots of several hundred at a time. The eggs hatch in one to three weeks, depending on water temperature, and the young fish are 3-6 inches in length by autumn. The reproductive potential of the carp is favoured by early maturity, a long life, and a large egg production which make it one of the most prolific of freshwater fishes.

FOOD

The feeding areas of the carp lie in the soft-bottomed and weedy parts of the lake and rivers where they suck in large amounts of mud and debris along with food items. The principal foods of the carp of Lake Simcoe are algae and other vegetation, larvae of aquatic insects (particularly chironomids), snails, small crustaceans, worms, weed seeds, and surface insects. The carp may be considered omnivorous as it consumes a great variety of organisms and materials by its rather unselective feeding method. The carp interfere somewhat with the other fishes of the shallow water by stirring up the bottom mud and uprooting the aquatic vegetation. Waterfowl are most affected through damage to wild rice beds.

ANGLING

Few carp are taken from Lake Simcoe with hook and line. Sport fishermen prefer to seek other species of fish which are more available to anglers and held in higher esteem. Exploitation of the carp population is left more-or-less to the nets of the commercial fishermen. Carp are taken rarely on dough balls, earthworms, pork rind, or like baits in the Cook's Bay area and it is very likely that a sport fishery for carp could be developed in Lake Simcoe.

REGULATIONS

A commercial fishery for carp in Lake Simcoe was established by regulations imposed early in the century at the peak of the carp abundance. Since that time, carp have been taken commercially by netting only under the authority of seine and dip net licences. In the early years of the carp fishery, there was a conflict in ideas between the commercial and sport fishermen. While the anglers denounced the carp as a menace to the sport fishery, the carp fishermen asked for its protection and even for artificial propagation. The result was its protection during the spawning season for a number of years.

There are no restrictions on the angling of carp in Lake Simcoe. In addition, carp are recognized as coarse fish and may be taken in the months of April and May by means of a dip net not more than 6 feet square or in diameter during daylight hours. The necessity of imposing a regulation in 1952 which prohibited the possession of a spear near Lake Simcoe waters in order to protect certain species of game fish from poaching, unfortunately has prevented the spearing of carp which was an accepted spring sport in earlier years.

MANAGEMENT

The conflict between sport and commercial interests has been an outstanding feature of the carp fishery in Lake Simcoe. However, the gradual evolution of the fishery has been in the exclusive interests of the sport fishermen and, consequently, the carp has been reduced to the status of an undesirable coarse fish. The carp population during the past decade has been at the lowest level since the fantastic rise in numbers following its introduction into the lake. This has resulted in a growth of aquatic vegetation, particularly in the wild rice beds, more extensive than witnessed previously by most living people.

While the earlier commercial fishery proved to be a profitable one for a few fortunate fishermen, the present fishery and a low market value for carp does not offer a livable wage to commercial fishermen who must operate on a part-time basis, or not at all.

The management of the fishery requires that every encouragement be given to sport and commercial fishermen to harvest the population of carp as extensively as possible. While it is doubtful that even heavy exploitation can lower significantly the present population of carp, intensive fishing may serve as a check on population increases. There have been evidences of a slight increase in the numbers of carp during 1953 and 1954 although the population continues at a comparatively low level.

Sport fishermen do not recognize the carp as worthy game in Lake Simcoe. Anglers should be encouraged to adopt or develop those methods of fishing which have provided recreational fishing in other southern Ontario waters. The recreational value of the carp fishery may be enhanced often by organized carp derbies.

The commercial carp fishery has been more-or-less inactive in recent years. Fishermen are unwilling to put much effort into the fishery until it becomes more profitable through better market prices or increases in the numbers of carp. As effective management of the Lake Simcoe sport fishery requires that the carp population be kept at the lowest possible level, an extensive programme of coarse fish removal must be considered to combat any serious rise in carp numbers. This would entail the co-operation of all licensed fishermen preferably on a voluntary basis but perhaps as a condition of licence.

THE MINNOWS

There are a great number of minnows in Lake Simcoe although few species are represented. The largest of the minnows is the carp, *Cyprinus carpio*, which has been discussed separately on account of its place in the history of the fishery. The lake emerald shiner, *Notropis atherinoides*, exceeds all other minnows in abundance and in importance as a forage fish and bait minnows. Other minnows used occasionally as bait include the spottail shiner, *Notropis hudsonius*, the common shiner, *Notropis cornutus*, the redbelly dace, *Chrosomus eos*, the blacknose dace, *Rhinichthys atratulus*, the bluntnose minnow, *Hyborhynchus notatus*, and the creek chub, *Semotilus atromaculatus*. Less common among the minnows are the finescale dace, *Pfrille neogaeus*, the blacknose shiner, *Notropis heterolepis*, the fathead minnow, *Pimephales promelas*, and the longnose dace, *Rhinichthys cataractae*. Although Rawson (1930) lists the silvery minnow, *Hybognathus nuchalis*, among Lake Simcoe minnows, it was not observed in the present study. In view of the familiarity of most Lake Simcoe fishermen with the lake emerald shiner, a brief description of this species follows.

THE LAKE EMERALD SHINER

History and Status of Fishery: The lake emerald shiner is the most common minnow in Lake Simcoe and serves as an important item of food of most sport fishes at some season of the year. Its abundance is particularly evident during the spring and autumn months when large numbers of lake shiners congregate in large schools along the lake shore and in the river mouths and tremendous quantities are taken for bait by anglers and commercial fishermen from around docks, boathouses, bridges, and small bays.

Those lake shiners taken in the spring are used almost exclusively as live bait in the angling of yellow perch, whitefish, and other fish although only a low percentage of the autumn harvest is kept alive for winter angling. While many anglers are able to capture sufficient quantities of live minnows for their own needs with small dip nets, the strong demands for live bait by sport fishermen of Lake Simcoe and other waters have created a small commercial fishery. The quantities of lake shiners taken for sale as live bait by commercial fishermen make up only a minor part of the annual harvest of lake shiners.

The bulk of the autumn harvest of lake shiners is preserved in salt for the winter ice fishery where they are used primarily for the prebaiting and baiting of whitefish and herring. Each ice fisherman customarily preserves sufficient minnows for his personal requirements while residents engaged in the rental of fishing huts require enough for the use of their patrons. Although live minnows are often preferred for baiting the hook and numbers are kept alive in retainers all winter for this purpose, salted minnows are used extensively, for sufficient live minnows are not usually available. As any person may possess 40 pounds of minnows during the winter months, the quantities of salted minnows stored by some families may reach several hundred pounds.



Figure 25—A basket of salted lake shiners used as bait by a whitefish fisherman.

Life History: The lake shiners live characteristically in large schools with few or no other kinds of fish among them. The spring and autumn migrations of great schools to the sand and gravelly shoreline and rivers of the lake are spectacular annual events. The lake shiner prefers the cool open waters of the lake and avoids the weedy areas which harbour most of the other kinds of minnows.

It spawns in late spring and by mid-November the young-of-the-year average nearly two inches in length at a weight of 0.3 ounces. By the following autumn, the fish have grown to three inches in length with an average weight of nearly one ounce. Few lake shiners survive until the autumn of the third

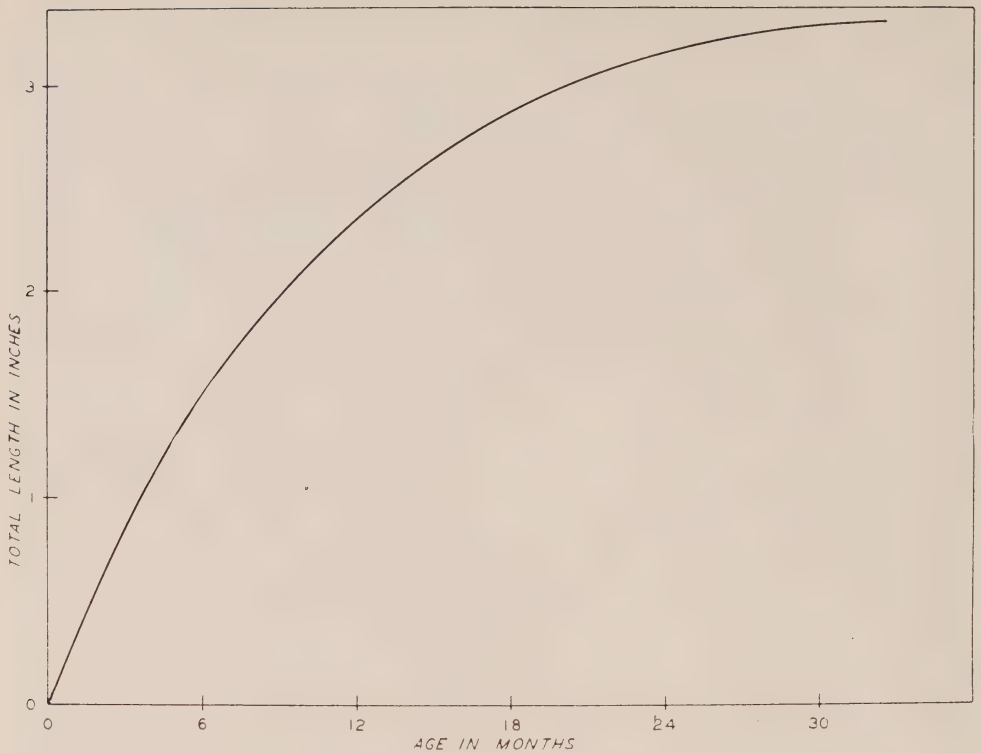


Figure 26—Growth curve of the emerald lake shiner in Lake Simcoe.

year although several specimens measuring 3.3. inches and weighing 1.2 ounces were collected. The two common age groups may occur in separate or mixed schools where they are recognized easily by the marked differences in lengths. The growth rate of the lake emerald shiner is given in Figure 26.

FOOD

Lake shiners are observed frequently while feeding in schools near the surface of the water. Their food appears to be primarily terrestrial and aquatic insects although no detailed study of feeding habits has been undertaken.

REGULATIONS

There are certain fisheries regulations which impose controls on the capture, possession, and sale of minnows.

Minnows may be taken by a small dip net, not over three feet square or in diameter, without a licence. A special \$1.00 licence allows fishermen to take minnows for personal use as bait with a seine with dimensions not greater than 30 feet by 6 feet, or a dip net not over 6 feet square or in diameter.

Anglers are restricted to an individual possession limit of 50 minnows between April 1st and October 31st. From November 1st to March 31st, a person may have in his possession minnows weighing in the aggregate not more than 40 pounds.

There are commercial fishing licences which permit the taking of minnows for sale to anglers by means of a seine, dip net, or minnow trap. Commercial operators may pickle minnows only under the authority of a special permit.

MANAGEMENT

The minnow population of Lake Simcoe contributes substantially to the excellent quality of most of the sport fishes of the lake either as direct items of food or as a link in the food chain and must be recognized as an important factor in fish production. Of secondary importance is the harvest of minnows, particularly lake shiners, as bait for the sport fishery. Although most species of minnows have demonstrated an ability to maintain their numbers at the present rate of exploitation by fishermen, regulations have been found necessary to manage the harvest and assure an efficient use of minnows without waste and in the best interests of the sport fishery.

Recent legislation has overcome the important problems of the summer fishery when minnows are taken almost solely for use as live bait. While lake shiners are used extensively, the larger species of lake and stream minnows are preferred when available as bait for bass and pike and are often imported from neighbouring waters for that purpose.

The late autumn harvest of minnows continues to present problems in management. Although infrequently there are abnormally small fall runs of lake shiners and winter fishermen are hard pressed to obtain sufficient minnows for winter use, tremendous quantities of lake shiners are taken in most years in order to satisfy the demand for live and salted minnows during the winter sport fishery when minnows become difficult to harvest. Although live minnows are taken in reasonable quantities by most commercial fishermen and anglers requiring live bait for winter sale or personal use, some fishermen take quantities of minnows greatly in excess of personal winter requirements for salted bait and it is not unusual to see bags or baskets of salted minnows left on the ice or in garbage dumps to rot in the spring. When lake shiners are abundant in the autumn, large numbers are often found lying neglected at locations where there has been recent netting as a result of careless handling. Conservation officers require more effective legislation to manage this autumn fishery.

Legislation concerning the possession of minnows during the winter months is not satisfactory. As any person is allowed to possess up to 40 pounds of minnows, the quantity of minnows which an individual may keep at his residence is dependent on the number of occupants in the house while his actual requirements are given no consideration. It makes no difference if the individual is a non-fisherman, the owner of a fishing hut, or the commercial owner of a group of fishing huts. This situation may be improved by a drastic reduction in the quantity of minnows which an angler may possess who is not the owner of a fishing hut and normally rents a hut with bait supplied. An angler of this

group who demonstrates a need for a larger quota could be granted one under a special permit. Suitable quotas to private or commercial owners of fishing huts, based on the number of huts owned individually, would end the need for illegal or questionable practices now prevalent. Quotas could be established efficiently only by a registration of all huts used in the winter ice fishery.

The management of the minnow fishery would be aided by a discontinuance of the special licence granted to anglers to take minnows by means of a 30-foot seine net for personal use. The considerable abuse of the privileges of this licence, particularly during the spring and autumn, is a matter of concern.

The prebaiting and baiting of whitefish with salted minnows is an accepted practice in Lake Simcoe but should be employed with greater discretion by many fishermen who unwittingly are spoiling their own angling and that of the neighbouring fishermen by a heavy baiting of local whitefish grounds. In some cases, the resulting low interest of the whitefish in baited hooks has caused the use of illegal snagging devices. Fishermen should be encouraged to use minimum quantities of bait to attract whitefish to their fishing huts and to consider the substitution of salted minnows with chopped ling flesh, cooked rice, wheat and other grains which are considered to be satisfactory for pre-baiting although live minnows are preferred for actually baiting the hook.

THE CATFISH

Representatives of the catfish family in Lake Simcoe include the brown bullhead, *Ameiurus nubilosus*, the yellow bullhead, *Ameiurus natalis*, and the channel catfish, *Ictalurus punctatus*. Of these, the brown bullhead is the common species.

Bond (1838) noted that he speared "a hideous-looking fish, with a large head . . . He was what the Canadians call a catfish . . . He was, of course, not eatable." This observation made in 1815 would seem to express the sentiments of the early settlers for there is no record of any interest in the catfish family until 1891 when 4,950 pounds were reported in the commercial fishery. After that time, catfish composed a very small and inconsistent part of the commercial catch (see Figure 27) as a total of only 53,000 pounds was reported to have been taken commercially between 1891 and 1954.

Angling for catfish has gained none of the popularity which the sport fishes of Lake Simcoe enjoy although there is considerable local recreational fishing for bullheads in several of the rivers where anglers may fish from bridges, river banks, or small boats during the spring and summer months.

The brown and yellow bullheads are similar in appearance and habits and are seldom recognized as different species by fishermen. The bullheads are fish of quiet waters and are found in the sluggish lower reaches of the rivers and in the soft-bottomed weedy bays of the lake. They are spring spawners and deposit their eggs in nests scooped out of the soft bottom of the rivers and weed beds. The male fish guard the eggs and the schools of young fish until they are an inch or more in length. The newly-hatched fry grow to 2 or 3 inches by the

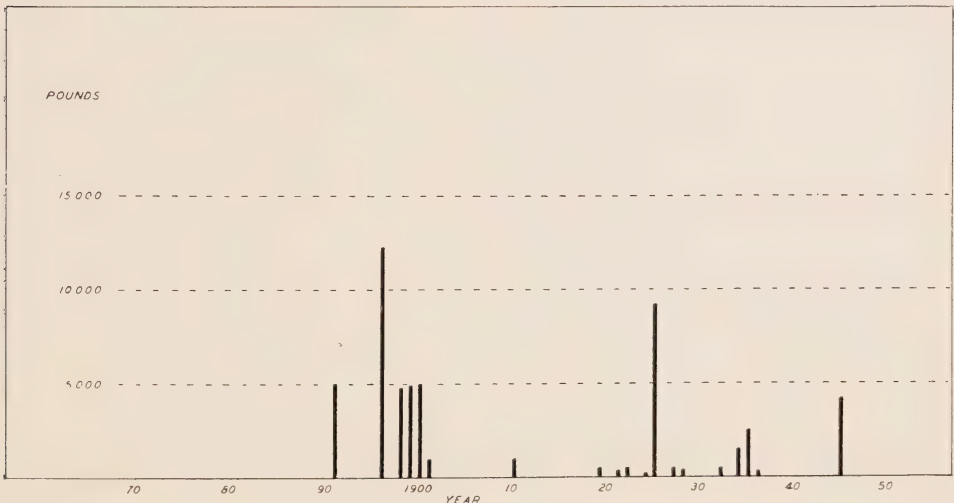


Figure 27—Commercial fishing returns for catfish in Lake Simcoe.

end of the first year and mature in 3 or 4 years. While bullheads do reach a foot or more in length, those taken by anglers usually average between 7 and 10 inches. They are omnivorous feeders which live largely on insect larvae, crustaceans, molluscs, aquatic vegetation and small fish. The bullheads are apparently relatively free from predation by other fish on account of their spiny dorsal and pectoral fins.

The fishing of bullheads requires no elaborate equipment as they are taken easily by hook and line with worms or other baits. Consequently, they provide excellent recreational fishing for children and novice fishermen. Some people prefer the flesh of the bullhead to that of other food fishes and angle for them regularly. As there is presently no commercial fishery and a limited sport fishery, a greater harvest of the bullhead population is desirable.

The channel catfish grows to a much larger size than the bullheads, occasionally reaching 25 to 30 pounds, and has a ravenous appetite for all manner of living and dead material while showing a preference for minnows, perch, and the young of other fish. The channel catfish is taken occasionally by fishermen and some people enjoy the flavour of its white flesh. Although the population of this species would seem to be low, it should be harvested whenever possible.

THE MASKINONGE

During the 19th century, maskinonge, *Esox maskinongy*, were abundant in certain parts of Lake Simcoe, particularly in Cook's Bay and to a lesser degree near the weedy river mouths and bays on the east and north shores. There was a good maskinonge fishery in the area of the Atherley Narrows and in Lake Couchiching to the north.

The first annual commercial fishing returns in 1868 listed 25,000 pounds of maskinonge taken from Lake Simcoe waters. The numbers of this species taken commercially between that time and 1904, when the sale of maskinonge was prohibited, totalled 229,050 pounds. This quantity doubtlessly formed only part of that taken for local consumption. Although there were few restrictions on the method of capture in these early years, the numbers of maskinonge taken for sale by netting, spearing, and angling varied greatly from year to year with no apparent explanation (Figure 28).

The maskinonge was abundant in Lake Simcoe around 1900 for local fisheries officers noted that maskinonge were most plentiful on the spawning beds and that poaching in the Holland Marsh was difficult to control. During the following years, the numbers of this fish would seem to have remained high as evidenced by the quantities of maskinonge taken by carp fishermen and returned to the

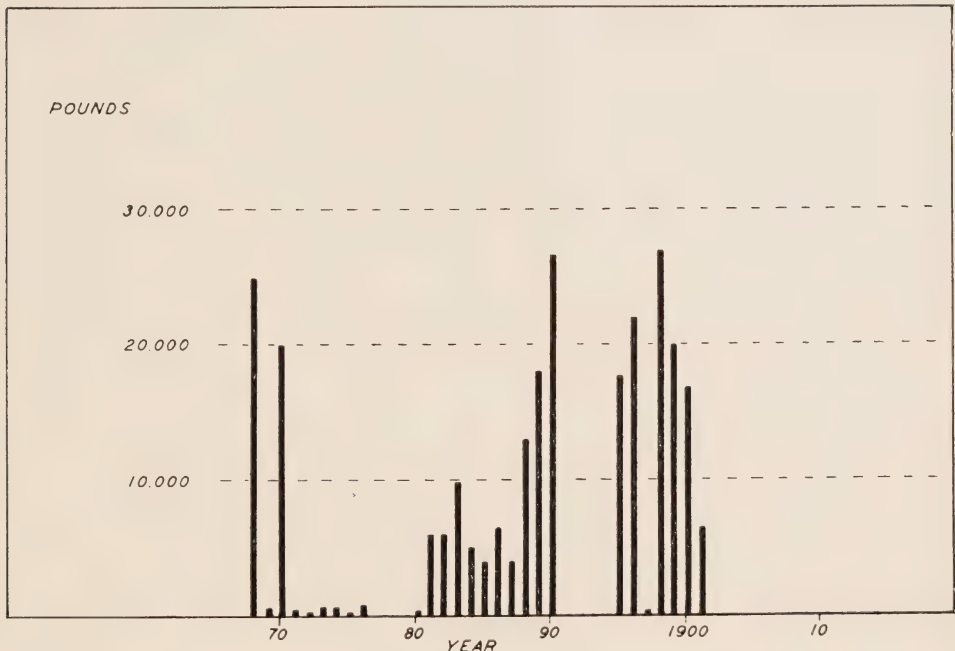


Figure 28—Commercial fishing returns for maskinonge in Lake Simcoe.

water. However, even in these early years when a large population of maskinonge was present in the lake, there were good and poor angling years if the reports of the overseers were at all accurate.

The population of maskinonge remained at an appreciable level through the first quarter of this century, although there was a slow but steady decline in the numbers of this species taken by hook and line. Maskinonge were taken less and less frequently in the weedy bays and rivers and, by about 1930, the only significant fishery was restricted to the Cook's Bay area although odd specimens were taken by anglers elsewhere in the lake and in Lake Couchiching to the north.

The rather rapid dwindling of the maskinonge population in the Cook's Bay area after 1930 coincided with the appearance of the pike. One competent local fisherman who watched the decline of the maskinonge and the sudden rise in the numbers of pike stated in reminiscence that "no matter how much spearing was done in the Holland Marsh, there was no noticeable decrease in the maskinonge until the pike became numerous." It is of interest that the catches of maskinonge decreased noticeably first at the north end of the lake where the pike were first noticed in numbers, then in the Cook's Bay and Holland Marsh area, and finally in the Island Grove and Pefferlaw areas where the captures of maskinonge dropped off quickly during the 1930's at which time pike became resident in the area.

Although plantings of maskinonge fry and fingerlings have been made in Lake Simcoe since 1936 (Table VI), the maskinonge fishing has continued to depreciate until now this fish contributes practically nothing to the sport fishery. While maskinonge are infrequently captured or observed at spawning time in the Pefferlaw and Talbot Rivers, the population of this species has become confined largely to the Cook's Bay area where, although few are taken by anglers, small numbers of maskinonge are still present. These remaining maskinonge may be observed while spawning in the inundated parts of the Holland Marsh in the spring of most years when Conservation Officers make every effort to prevent extensive poaching. Those maskinonge observed on the spawning beds and those taken rarely by anglers are characteristically large, seldom under 20 pounds in weight.

TABLE VI
PLANTINGS OF MASKINONGE IN LAKE SIMCOE

YEAR	Number of Fish	YEAR	Number of Fish
1936.....	25,000	1951.....	120,800
1940.....	25,000	1952.....	72,300
1941.....	25,000	1953.....	70,700
1948.....	100,000	1954.....	10,100
1949.....	40,700	1955.....	121,200
1950.....	121,200	Total.....	732,000

LIFE HISTORY

Distribution: Comparatively small numbers of maskinonge move into the shallow weeded areas of the Holland Marsh during the spawning season. It is believed that a few others still spawn in several weedy bays of the lake as maskinonge appear very occasionally in the Pefferlaw, Talbot and other rivers during April, May and June. Infrequent captures of maskinonge suggest that at other seasons of the year the meagre population of these fish is confined largely to the Cook's Bay area while a few are scattered on the east and north shores.

Age and Growth: The young maskinonge grow quickly and commonly attain a length of 10 or more inches during their first year but are then only several ounces in weight. By the fifth year, they are about 30 inches in length and weigh some 4-5 pounds. At 10 years of age, maskinonge weighing 20-25 pounds measured over 45 inches in length. A 54-inch female maskinonge weighing 30 pounds was aged at 14 years. The growth rate for Lake Simcoe maskinonge is given in Figure 29, based on only a small sample of this species.

Breeding Habits: Observations on the breeding habits of the maskinonge have been limited to the Holland Marsh. Maskinonge spawn in the Holland Marsh in shallow weeded areas with water depths from about 6 to 18 inches. Here during late April and May the fish can be observed while swimming in pairs with dorsal fins at the surface of the water. The maskinonge do not

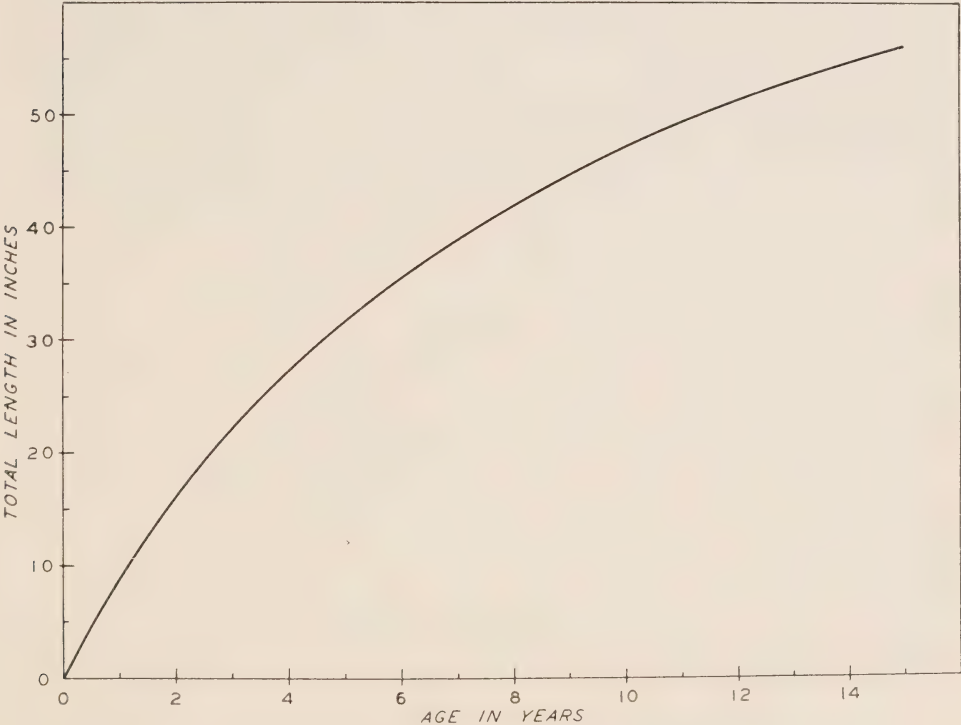


Figure 29—Growth curve of maskinonge in Lake Simcoe.

make nests nor protect their young but scatter the eggs and milt among the vegetation at random. The eggs hatch in about two weeks under normal weather conditions.

As the maskinonge observed on the spawning beds of the Holland Marsh have been characteristically large fish of 20 to 40 pounds, the age of maturity has not been accurately determined. A 38-pound female maskinonge seized from poachers contained over 250,000 eggs.

FOOD

The maskinonge are voracious feeders as suggested by their remarkable rate of growth. While the newly-hatched fry feed on minute animal and vegetable life, maskinonge of less than 2 inches have become fish eaters, feeding on small minnows and the very young of other fish. In adult life, the maskinonge feed quite exclusively on minnows, suckers, catfish, perch and any other fishes which are available. Although large maskinonge have been taken at depths of 35-40 feet, the principal food species are essentially those of the warm littoral or shoal waters.

ANGLING

The maskinonge has faded from the sport fishery of the lake although senior resident fishermen can recall the time when maskinonge were abundant and offered remarkably fine fishing. It is doubtful if any anglers now consider it worthwhile to fish for maskinonge in Lake Simcoe. The total annual captures of an estimated dozen or less fish are made usually while trolling or casting for pike or other warm water species. Baits are commonly of the spoon, wobbler, or plug variety.

REGULATIONS

A closed season had been placed on the maskinonge as early as 1889 by which time the gill netting of any fish in Lake Simcoe had become illegal although there were no other restrictions on the method of capture and no length or creel limits. In 1900 a daily limit of four maskinonge of 18 inches in length was imposed. The sale of maskinonge was prohibited in 1904. In 1910, the legal fork length was raised to 24 inches and remained unchanged until 1931 when it became legal to take two maskinonge per day regardless of length. A fork length of 30 inches was enacted in 1946 and modified to a total length measurement in 1954 with a possession limit of two maskinonge at any time. The closed season which has covered adequately the spawning season for many years although the period, January 1st-June 15th, of 1918 has been gradually lengthened to the present closure extending from October 16th to the following June 30th.

MANAGEMENT

The population of maskinonge in Lake Simcoe has continued to decline in spite of the protection given to it by fisheries regulations establishing extensive closed seasons and drastic restrictions on creel limits and legal lengths.

Present limits on the size and numbers of maskinonge which may be taken by angling are of little value particularly in view of the absence of a significant sport fishery.



Figure 30—Conservation Officers hold three maskinonge, weighing from 38 to 42 pounds, seized from poachers on the spawning beds of the Holland Marsh.

The closed season, making illegal the possession of maskinonge during the spawning seasons, would appear to be the only valuable part of present management legislation. As the future of the maskinonge of Lake Simcoe is dependent on the natural reproduction of those small numbers of parent fish which still move into the shallows of the Holland Marsh to spawn, every effort must be made to protect them from unscrupulous poachers who still cause concern to conservation officers although recent offenders have received heavy penalties.

Plantings of over $\frac{1}{2}$ million maskinonge fry and fingerlings have been made in Lake Simcoe waters since 1936. There has been no indication that these plantings have been of value in maintaining the present low population level although it is certain that they have neither improved angling success nor increased noticeably the numbers of maskinonge. In spite of the exceedingly low population of maskinonge, there would appear to be sufficient parent fish to multiply their numbers by natural reproduction under suitable environmental conditions. However, all available maskinonge fry and advanced fingerlings should be planted in the Holland Marsh area as long as there is any possibility

that restocking may help sustain the maskinonge fishery. The value of supplementing the natural reproduction of native fish by planting parent fish from other waters on the breeding areas at spawning time should be considered.

The decline of the maskinonge population during the past 40 years is coincident with three remarkable changes in the fauna and habitat of the Cook's Bay and Holland Marsh area where it formerly thrived.

Firstly, there came the introduction of the carp which subsequently took complete possession of the weedy areas and destroyed much of the rooted aquatic vegetation which was the preferred habitat of the maskinonge. While the fishermen's criticism of the damage done to the maskinonge by the carp has merit, it is of interest that the numbers of maskinonge have continued to drop although carp have not interfered seriously with its habitat for several years. However, the control of the carp at the lowest possible level is desirable.

Secondly, the tremendous increase in the numbers of pike has paralleled a corresponding decrease in the maskinonge population. The apparent incompatibility of maskinonge and pike has been a notable occurrence in several other Southern Ontario waters. Although the maskinonge and pike breed more-or-less on the same inundated areas of the marsh, the earlier spawning time of the pike gives it a decided advantage as its progeny are not often threatened by fluctuating water levels. By contrast, a lower water level frequently excludes the later-spawning maskinonge from reaching parts of the spawning grounds and a further lowering of the water may trap adult maskinonge in the marsh, destroy eggs deposited in the shallows, or prevent fry from reaching the waters of the lake. Although no predation of young maskinonge by pike has been observed in Lake Simcoe, even the young-of-the-year pike are sufficiently advanced to be potential enemies of the young maskinonge.

Thirdly, the original spawning areas of the maskinonge in the Holland Marsh have been restricted by the dyking and draining of marshland for agricultural purposes. However, it should be noted that much of the land under cultivation did not provide suitable spawning areas so that the damage done to the maskinonge is not as great as the sight of the extensive areas of market gardens has led many observers to believe.

As the future welfare of the maskinonge in Lake Simcoe would seem to be dependent on conditions related to natural reproduction and the survival of young fish in the Holland Marsh, the most hopeful management procedure would seem to be the development of a fish culture programme there which would assure (1) that the adult maskinonge have access to all suitable spawning areas, are protected from poachers and other factors while breeding, and are able to return unimpeded to the lake and (2) that the eggs and young fish are protected from fluctuating water levels and predation, are provided with adequate food for rapid growth, and become distributed in the proper habitat areas of the lake. This work should be supplemented by the planting of hatchery fish.

An attempt to restore the maskinonge fishery in Lake Simcoe under altered environmental conditions would constitute a worthwhile management research. The extent of public interest in the future of the maskinonge in this and other waters should determine if an attempt should be made to re-establish the fishery.

THE NORTHERN PIKE

The early history of the pike, *Esox lucius*, in Lake Simcoe waters forms a confusing picture. While early statistical records reported a commercial catch of 382,400 pounds of pike during the 19th century, the qualified statements of many senior residents around the lake are in agreement that no pike were observed in Lake Simcoe until long after the turn of the century. However, the quantities of pike reported in the commercial returns would seem to be explained by the occurrence of pike in other waters of the Trent Canal System between Lake Simcoe and Georgian Bay. As was often the practice in early statistical records, the commercial catches from these smaller lakes were probably grouped together and listed under the largest neighbouring body of water, in this case Lake Simcoe. It is very likely that some pike did occur in Lake Simcoe, for a reference made in the Canadian Handbook and Tourists' Guide of 1866 indicated the presence of a few pike in Cook's Bay near Gilford and in Lake Couchiching to the north of the Atherley Narrows.

Although the amount of pike in Lake Simcoe during the 19th century is questionable, it must be concluded that by early in the present century pike were either absent from the lake, or present in such small numbers that they were neither seen nor captured by fishermen of that era. It was not until about 1920 that pike first appeared at the north end of the lake around Smith's Bay and the Atherley Narrows. These first fish, one weighing 20 pounds, were caught in the seines of carp fishermen and were the object of considerable local interest. The presence of a pike in a tributary stream of Kempenfeldt Bay was noted at about the same time, and the weedy portions of the bay have supported a relatively low population of pike since that time.

From the records of the appearance of pike in other parts of Lake Simcoe, it would seem that the population of pike originated at the north end of the lake and spread gradually around the lake in a counter-clockwise direction. Rawson (1930) apparently had not seen any pike during his biological studies between 1926 and 1928 which caused him to state "the absence of pike is a remarkable and unexplained feature of the fish fauna of Lake Simcoe." However, by 1927 or 1928 pike were observed in Cook's Bay and the Holland Marsh. These pike came into the ditches which had been dug to facilitate the seining of carp. The failure of the vigorous activities of the carp fishermen to disclose the presence of pike at an earlier date attests to its absence. Once the pike had become established at the south end of the lake, they increased rapidly in numbers until, by 1932, there was a sizeable spring run into the Holland Marsh where they spawned.

The pike continued to expand its distribution and, by 1933, had made its appearance in the Island Grove area of the east shore where its numbers have multiplied in recent years. By 1938 or possibly earlier, pike had reached the Pefferlaw River where they were at first mistaken for small maskinonge. The pike became more numerous after that time and has made up a small part of the local sport fishery since about 1946.

The greater part of the pike population of Lake Simcoe has become established in the Cook's Bay area where, in contrast to most parts of the lake, this fish has gained favour among the anglers. During the early part of each spring, many thousands of pike invade the flooded lands and ditches of the Holland Marsh when they are a spectacular sight while on their spawning beds. While concentrated in such numbers, these pike are ready prey for poachers armed with clubs or spears. This activity has been curtailed only through the active vigilance of Conservation Officers.

LIFE HISTORY

Distribution: The pike population of Lake Simcoe is concentrated in the Cook's Bay area, although quantities of pike frequent those weedy bays at the north end of the lake and other inlets scattered along the lake shore.

In early spring, often before the ice has left the lake, great numbers of pike move into the shallows of the Holland Marsh while elsewhere smaller numbers of pike approach the limited local spawning areas. By early May, spawning has been completed and the pike have left the breeding grounds. They become distributed through the lower Holland River, Cook's Bay, and the other smaller bays and river mouths of the lake where many of the fish spend the balance of the year. Other pike appear in the Talbot, Pefferlaw and other rivers. Some of those pike breeding in the Holland Marsh move some distance up the shore during the summer and are taken by angling as far as Island Grove and around Snake and Fox Islands.

Although the pike show a definite preference for shallow weedy areas and are caught mostly in these locations, some are taken by angling each year on the stony, smallmouth bass shoals while a few fish are caught in up to 30 feet of water. Those pike taken at a distance from the spawning areas are characteristically large fish averaging 6 to 8 pounds and occasionally reaching 20 pounds in weight.

The winter distribution of the pike appears to be similar to that of the summer, although the fishery is more-or-less confined to Cook's Bay where some pike are taken by anglers and others are observed swimming beneath the ice.

Age and Growth: The voracious appetite of the pike results in a fast-growing fish which may attain a size second only to the maskinonge among Lake Simcoe fishes. Females appear to grow at a slightly greater rate than male fish, although there is a notable variation in the growths of individual fish of both sexes. The average growth rate of Lake Simcoe pike is shown in Figure 31.

Young pike may grow to 8 or 10 inches during their first year and may mature in three years. At 5 years of age, the pike average between 25 and 30 inches in length and 3.4 to 5 pounds in weight. At 10 years, average lengths have increased to 35-40 inches and weights to 12-15 pounds. Older pike are taken occasionally by anglers with lengths to 45 inches and weights over 20 pounds which have been aged at 12 to 14 years.

Breeding Habits: The pike breed early in the spring after moving into the ditches and streams of the Holland Marsh in late March or early April when

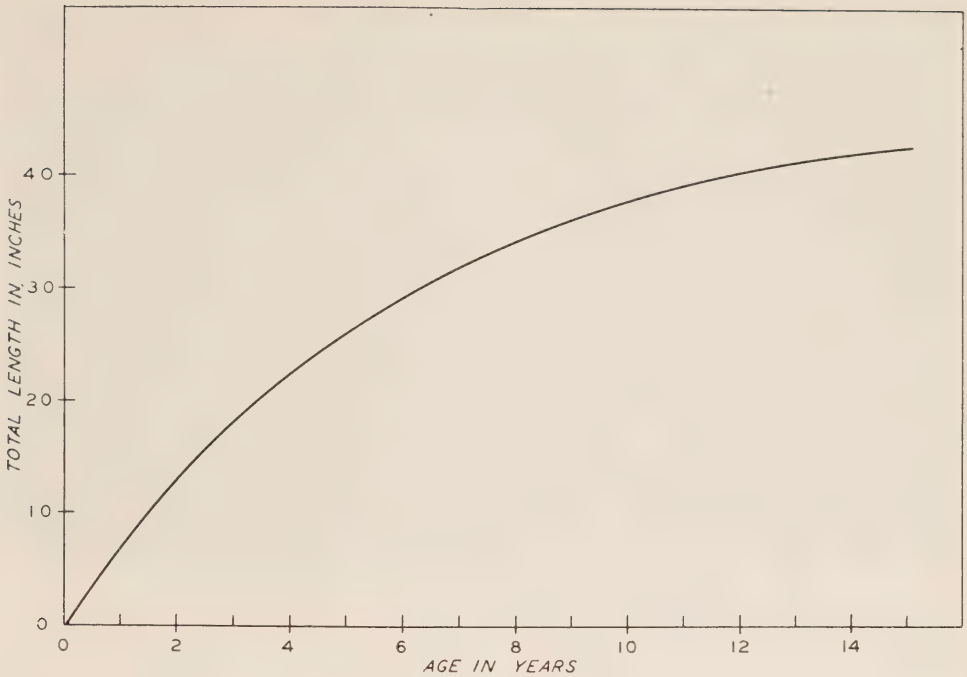


Figure 31—Growth curve of northern pike in Lake Simcoe.

ice may still cover the lake. While numbers of pike move up the small creeks to the uppermost reaches and may spawn in inundated agricultural lands, great quantities spread over the extensive shallow marshland where the water is up to two feet in depth in spring but may become dry by early summer. Spawning takes place in early April with afternoon temperatures commonly above 44-46°F. and may be observed easily by anyone standing on township roads or along ditch or river banks. In other parts of the lake, the smaller concentrations of spawning pike in less conspicuous weedy bays and rivers take place with relatively little public interest.

Small females of 3-4 pounds deposit upwards of 10,000 eggs which are scattered indiscriminately over the mud, detritus and vegetation of the shallows. Large females may deposit as many as 200,000 eggs each year. No protection is given to the eggs or young after spawning and both male and female pike leave the shallow marsh and make their way towards the lake. Pike are out of the ditches and small streams by late April in most years but are usually abundant in the Holland River and inner Cook's Bay for several weeks before assuming their summer distribution.

The eggs hatch in about a week when afternoon water temperatures may reach the 60's and the annual movement of millions of young pike, 1-2 inches in length, through the ditches and creeks on their way to the lake in late April and early May attests to the highly successful natural reproduction.



Figure 32—Spawning grounds of the pike in the Holland Marsh.

FOOD

The very young pike live on minute aquatic life, but within a few days are able to prey on small fish, insects and other life. The pike have a ravenous appetite and devour indiscriminately any live animals which are unfortunate enough to pass their way. Consequently the pike outgrow all other fish of the lake except the maskinonge and are merciless in attacks on sport fishes which share the same habitat.

The pike of Lake Simcoe feed primarily on live fish, although crawfish, frogs, leeches, larger insects, snakes, young waterfowl and miscellaneous items of food are eaten. The most common species of fish appearing in the stomachs of the pike taken by summer angling include the yellow perch, sunfish, black bass, pickerel, sucker, catfish and various kinds of minnows. At those times of the year when the cold water fish overlap that of the pike, lake shiner, lake herring and whitefish are eaten. Although no conclusive data has been obtained it is supposed that pike of all ages are potential enemies of the young maskinonge.

ANGLING

Serious interest in the pike as a sport fish is limited more-or-less to Cook's Bay and the Holland and Jersey Rivers where it has replaced the maskinonge in the sport fishery. Here the pike is the object of intensive angling at the opening of the season in mid-May when pike fishing is at its best and rental boats are at a premium. The summer fishery attracts many fishermen to the Cook's Bay area although enthusiasm tapers off as the summer progresses.

The common methods of summer fishing include angling with live minnows from anchored boats or casting, spinning, and trolling with spoons, wobblers



Figure 33—Pike fishermen concentrated in Cook's Bay in mid May.

and plugs along the weed beds. Winter fishing is done from the many private and rental fishing huts located on the ice where the anglers fish with live minnows for bait.

Outside of Cook's Bay the pike is not a popular species in comparison to the recognized game fish, although numbers are taken on conventional fishing gear in the weedy bays and rivers.

REGULATIONS

Fisheries regulations which concern the pike have a short history. Although the legislation initiated in 1932 covered all of Ontario's inland waters, few Lake Simcoe fishermen were in agreement with the protection of the pike which was increasing rapidly and appeared to threaten the maskinonge which was so highly prized.

A closed season was placed on the pike in 1932 which extended from April 1st to May 15th. In 1933 there came a daily limit of 8 pike and a possession limit of double that number. Since 1952 the closed season has included the period from April 1st to May 14th, although the daily limit was reduced to 6 pike in 1946 and the possession limit lowered to one day's catch in 1954.

Angling is the only legal way of fishing for pike in Lake Simcoe waters and fish taken by that means may not be sold. No size limit has been placed on the pike.

MANAGEMENT

The management of the pike in Lake Simcoe presents a peculiar problem in view of the mixed feelings expressed by fishermen concerning its value to the

sport fishery of the lake. The pike has established itself firmly in Cook's Bay and other local weedy areas which offer suitable habitat conditions in spite of the early wishes of most fishermen to keep it out.

Fortunately, the pike population is now regarded favourably in the Cook's Bay area where it has filled the need for a large sport fish caused by the decline of the maskinonge population and a low harvest of largemouth bass. It has come to form the nucleus of the sport fishery there, although fishermen recalling the days of the maskinonge consider it to be a poor substitute. Except in scattered bays, elsewhere in the lake where there are excellent fisheries for small-mouth bass, lake trout, whitefish and other fish, most experienced anglers of Lake Simcoe consider the pike to be of definitely inferior quality as a sport or food fish and regard it as a menace to the sport fishery.

The pike has demonstrated its great capacity to survive and multiply in definite areas of Lake Simcoe and would appear to be immune from possible over-exploitation by sport fishermen as it is indeed doubtful that even the most intensive angling could harvest adequately the annual crop of pike. Sport fisheries should be encouraged in all areas frequented by the pike, whether or not it has been accepted by local fishermen as a worthy addition to the fishery. Near those areas where pike are not wanted, heavy angling may help check further expansion of the population while at least providing recreation and food to some appreciative fishermen. In Cook's Bay an active fishery is desirable during both summer and winter months to harvest as much as possible of the annual pike production.

Of present fisheries regulations, only those concerned with the protection of the pike during the spawning season are actually effective in the management of the fishery although of ethical rather than proven biological value. The closed season (April 1st to May 14) has aided in a control of excessive poaching of pike while in the shallows of the Holland Marsh where they can be carried away by the bagful and of netting in the Holland River and its tributaries. A regulation prohibiting the possession and use of spears near Lake Simcoe, which was adopted for the protection of the maskinonge, has limited also the poaching of pike by this means. An advancement of the start of the closed season from April 1st to March 15th would provide better protection to pike moving in the spawning areas in late March.

Although the possession limit of 6 pike appears unnecessary to prevent over-exploitation by legal angling, it allows an ample creel for fishermen. Few fishermen are able to take their daily limit of pike with any degree of frequency and fewer anglers have use for more than 6 smaller pike, or one or two fish of perhaps 5 to 10 pounds.

As biological conditions favour the reproduction and growth of the pike in Cook's Bay and in its other scattered habitats of the lake, further protection of the pike is unnecessary although, of course, general regulations applying to the fishery (such as illegal spearing, snagging and snaring) are enforced.

A length limit on pike which has been advocated by fishermen for some Ontario waters is not considered necessary or desirable in Lake Simcoe and would be expected to result possibly in a lower overall annual harvest of pike with no significant increase in the percentage of larger fish among the pike population.

The important pike fishery of Cook's Bay is dependent on natural reproduction in the Holland Marsh and it is essential that adequate spawning areas be available. While it is true that the development of sections of the marshlands has reduced the extent of areas suitable for spawning during the past 25 years, it must be noted that it was during this period that the pike population continued to multiply to its present substantial level. Marshlands now being developed have not been generally satisfactory for the spawning of pike. Much of this land was relatively high, some was naturally dry and other lower areas were inaccessible to the pike. Other parts were temporarily inundated with the result that many adult fish or their progeny were trapped in the shallows by receding water and lost to the fishery. In several places dykes now prevent this latter occurrence and force the pike to spawn in locations favouring the survival of parent and young fish. The effect of future agricultural practices in the marsh on fish production must be appraised annually in order to assure a sustained pike fishery.

THE TROUT-PERCH

The trout-perch, *Percopsis omiscomaycus*, appears in the lower reaches of several of the rivers of Lake Simcoe each spring where the characteristic markings of this 3-5 inch fish attract the attention of fishermen. The body is silvery in colour and marked by a row of dark spots along the midline of the back, another along the upper portion of the sides, and a third row of more pronounced spots along the midline of the sides. Fishermen commonly consider it to be a kind of minnow or confuse it with young of certain sport fishes although it belongs to a separate family. The greatest numbers of trout-perch have been observed in the Pefferlaw River.

The trout-perch is essentially a lake fish where it lives on aquatic insects and crustaceans and serves as excellent forage for larger fish. Although it is taken occasionally for bait while in the rivers, it lacks the hardiness necessary to be a good live bait species.

THE YELLOW PERCH

HISTORY AND STATUS OF FISHERY

The yellow perch, *Perca flavescens*, is a common fish of Lake Simcoe which has made a valuable contribution to the sport fishery although it has been of only moderate importance in the commercial fishery of the lake.

The commercial returns for the perch of Lake Simcoe from 1868 until 1940 are given in Figure 34. No perch were reported to have been sold between 1868 and 1910, except for two years, 1896 and 1898, when catches of better than 16,000 pounds each were shown. In 1911, a catch of 34,730 pounds was reported which marked the start of a small commercial fishery which averaged about 5000 pounds annually between 1911 and 1940, after which time perch could no longer be taken under a commercial coarse fish licence.

The sport perch fishery of Lake Simcoe was noted first in the literature by Bond (1838) who related that he captured a perch by spearing on August 21, 1815. The Canadian Hand Book and Tourists' Guide of 1866 reported that perch could be fished in the Gilford area of Lake Simcoe but suggested that few fishermen would be interested. The lack of further references to the perch, coupled with the absence of a commercial fishery except in 1896 and 1898, attests to the unpopularity of the perch during the 19th century. However, the present century has seen the sport fishery develop into one of considerable interest during all four seasons of the year, particularly during the spring months when spawning runs of perch are reason for great activity among anglers. At other times of the year, the perch fishery is of less importance than that of certain of the other fishes of the lake but continues to grow in popularity each year.

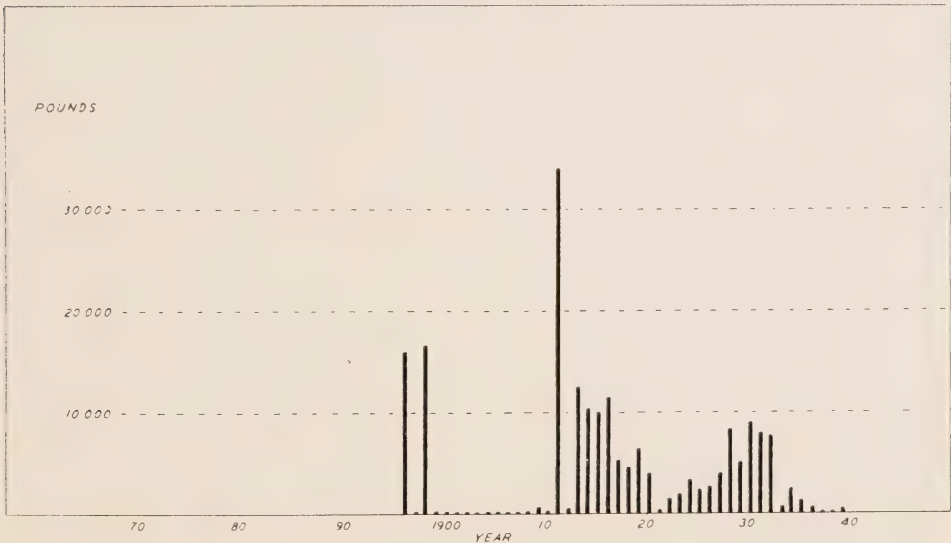


Figure 34—Commercial fishing returns for yellow perch in Lake Simcoe.



Figure 35—Perch fishermen gathered on a Government wharf.

In April and May, local and tourist fishermen congregate at the larger rivers on the east and north shore of the lake where it is difficult to find space to fish on the bridges or along the river banks. Boats are used in the rivers and river mouths by those fishermen fortunate enough to obtain them. Around the lake, the Government wharfs and many private docks are populated with fishermen employing many types of fishing tackle from a willow gad to the latest spinning gear. For example, on April 19th, 1953, there were 110 fishermen on the Government dock at Jackson's Point and 28 boats of anglers just off shore. Boat fishermen huddle over several shoal areas in the lake, particularly a small one in Cook's Bay where 80 or more boats may be seen when perch fishing is at its best. When the perch run is on in the rivers and shoal areas of the lake, practically all fishermen are successful as even the most unskilled angler can scarcely fail to catch perch on a hook baited with a live minnow. As there is no limit on the catch of Lake Simcoe perch, fishermen frequently take home a bushel or more of this choice fish. While the extent and duration of the perch run in local areas vary considerably from year to year, there are few years when excellent catches of perch are not taken at some locations on the lake. The remarkable interest in the spring perch fishery may be attributed in part to "spring fever" which drives fishermen to the nearest fishing grounds at the first opportunity.

The summer and autumn fisheries are of minor importance as most of the serious anglers prefer to pursue the smallmouth bass, lake trout, or another of the larger species of fish which are in season. However, quantities of perch are taken around docks, rocky points, shoals, and weedy bays and are of particular value to those fishermen who lack an adequate boat or other equipment needed for fishing on the open lake. Some fishermen prefer the eating qualities of perch to those of other fish. A few anglers choose fly-fishing and spinning for perch as an excellent form of recreation. Perch are taken also on the smallmouth bass grounds, particularly by fishermen using worms and other live baits, but are considered to be a nuisance unless exceptionally large.

The winter fishery is not extensive when compared to that of the lake trout and whitefish but occurs at a number of locations around the lake shore. The winter perch grounds are located most commonly near river and creek mouths, off stony points and in shallow bays. They are taken usually in shoal areas in eight feet of water or less. Practically all fishing is done from fishing huts by means of handlines and hooks baited preferably with live minnows although other baits may suffice. Perch are taken occasionally on herring grounds while angling for freshwater herring with natural or artificial lures. Although the quality of each local perch fishery is extremely variable, anglers using live minnows may be highly successful and experienced resident fishermen are able to obtain enough perch for local commercial sale from time to time.

LIFE HISTORY

Distribution: The perch are able to live under a great variety of water conditions and, consequently, invade the habitats of most of the fishes of Lake Simcoe at some season of the year. They are essentially a lake fish although there are large seasonal runs into a number of rivers and creeks and some perch remain there for all of the year.

In early spring, usually about the middle of April, perch concentrate on the spawning areas of Cook's Bay and other shoals of the lake. During late April and May, there are usually extensive runs of perch into the rivers and even small streams around the lake. Following the spawning season, the perch become dispersed through the lake although characteristically remaining in schools.

Although numerous perch are caught near weed beds, around docks, or on gravel and rocky shoals during the summer months in about 8 to 20 feet of water, many perch move into deep water where they are seldom taken by angling. Considerable quantities of perch between 5 and 12 inches have been taken in August by gill nets set in over 80 feet of water. In autumn, the perch appear to remain distributed widely although they are most frequently captured in their spring and summer habitats.

In winter, large schools of perch are found in shallow water, usually 6 to 10 feet in depth, where there are shoals, points, bays, and in the rivers. Large numbers of perch move up the bigger rivers beneath the ice in late December, January and February.

Age and Growth: There would seem to be a considerable variation in the growth rates of Lake Simcoe perch while mature fish vary considerably in size. The young-of-the year perch which appear in schools in the shallows in late summer are one to three inches long and by the following year have reached lengths of 4 to 5 inches. The average growth rate for these perch is given in Figure 36.

Although the average-sized perch taken by angling are under a foot in length and weigh considerably less than one pound, perch over two pounds in weight have been taken. Of the hundreds of perch examined, no fish older than 9 years were encountered.

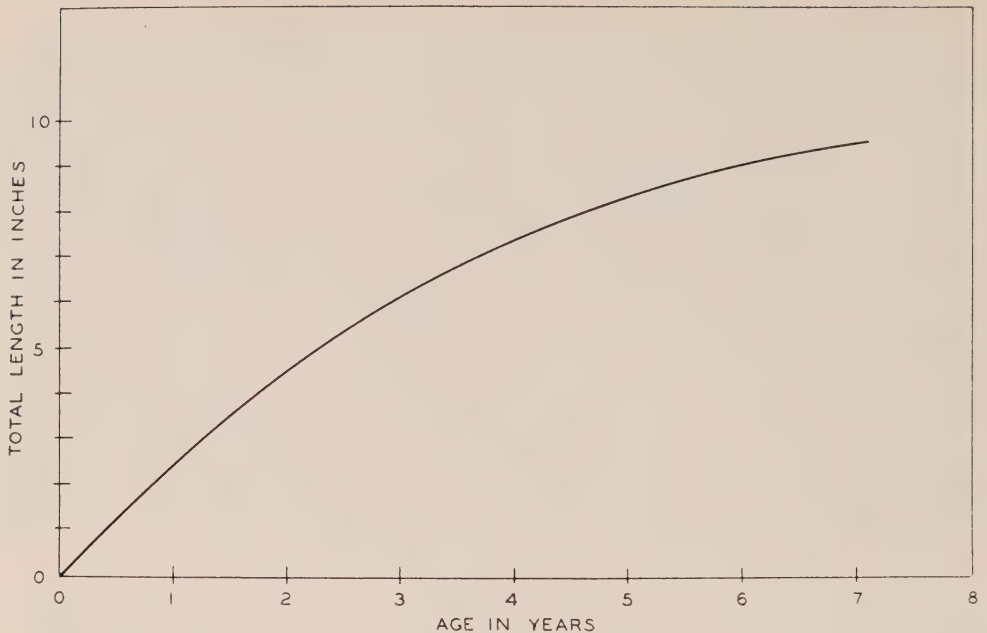


Figure 36—Growth curve of yellow perch in Lake Simcoe.

Breeding Habits: Large schools of mature perch spawn in local areas of the lake and its rivers in areas of sandy shoals or submerged vegetation. They are random spawners and deposit their eggs in long strings or ribbons with no apparent reference to the bottom. Consequently many eggs are lost. While there is a great variation in the size of spawning females, 12-inch fish have been found to contain some 20,000 eggs. No parental care is given to the eggs which hatch in about two weeks. The young fish which survive travel in schools near weedy areas where they feed and receive protection from enemy fish and birds. It is of interest that the most active perch fishery occurs during the spawning season at widely separated locations in the lake and its tributaries.

FOOD

The young perch feed in schools in weed beds where minute animals and insect larvae are abundant. Larger perch eat a diversity of items, principally living insects, crustaceans, and fish which allow the perch to live almost anywhere in the lake. The most common species of fish are various minnows, sunfish, sticklebacks, suckers, and freshwater herring. Crawfish and snails are frequent items. Insects include mayflies, other aquatic and terrestrial insects, and a variety of larval forms. Although the perch feed in deeper water during the day they may be observed feeding at the surface and along the shore in the evening hours.

ANGLING

The perch fishery extends over all four seasons of the year but reaches its peak during the spring spawning period when scores of fishermen line the



Figure 37—A group of perch fishermen anchored in the Pefferlaw River during the spawning run.

private docks, public wharfs, bridges, and river banks while other anglers cluster in anchored boats over various spawning shoals. They are taken also while angling for whitefish in Kempenfeldt Bay and other places where there is a spring whitefish fishery.

During the summer months, the perch provide recreational fishing for many anglers and there is a considerably less active but continuous fishery in those weedy and shoal areas of the lake frequented by perch. This fishery may extend on into the autumn under favourable weather conditions.

The winter fishery is confined largely to certain shoal areas where the perch are known to congregate. Here, anglers fishing near shore in 6 to 8 feet of water are able to exploit passing schools of perch with reasonable success.

Although the variety of food items eaten by the perch suggests that almost any bait could be used for their capture with about equal success, actually they show strong preferences which appear to be related to the natural food on which they are feeding at the time. Live minnows, usually the emerald lake shiner which is available in the greatest numbers and of a suitable size, are used extensively with the best success at all seasons of the year. Insects and artificial flies are effective during the period of mayfly emergence and at other times when the perch are feeding locally on this or other insect life. Worms are not usually recommended by experienced perch fishermen, although undoubtedly numerous perch are caught on this bait particularly during that summer fishery of the weedy areas. Perch are taken also on herring baits, crawfish, pork rind, fish eyes, small spinners and other conventional lures.



Figure 38—An angler with a catch of perch during spring run in the Talbot River.

REGULATIONS

There is no length limit, no creel limit and no closed season on perch in Lake Simcoe waters. Although a limit of 25 fish per day was placed on perch in 1940, it was discontinued after 1952.

Since 1940, perch may no longer be taken under the authority of a coarse fish licence and are reserved for the use of anglers. The only other restrictions on the present fishery are those general regulations which control the methods of angling and prohibit the sale of perch taken by angling.

Anglers may use live perch minnows taken from Lake Simcoe as bait in angling for other species of fish, but such bait may not be used for angling in other waters.

MANAGEMENT

The perch is one of the more important of Lake Simcoe fishes and contributes substantially to the fishery both as a sport fish and as an important food of the smallmouth bass, lake trout and other larger fishes of the lake. It provides fine recreation and excellent food for a multitude of fishermen and the minimum equipment required for successful angling bars no anglers from enjoying the sport.

The present policy of liberalized angling allows a considerable harvest of yellow perch when concentrated on the spawning grounds, although, at other times of the year, it does not appear to increase significantly the overall catch of perch above that of the period when a daily limit of 25 perch was in effect. While it is desirable to harvest the older perch from among the population and intensive angling is good management at present population levels it is unfortunate that each spring a few greedy fishermen jeopardize the position of liberalized angling by arousing just criticism for taking ridiculous quantities of fish beyond all limits of personal use.

The interest in the perch fishery has continued to increase each year until the present harvest by angling is believed to exceed the annual combined harvest of perch by the sport and commercial fisheries of earlier years. Future management must be based on the effect of the increasing demands on the fishery.

THE YELLOW PICKEREL

The yellow pickerel or walleye, *Stizostedion vitreum*, is native to the waters of Lake Simcoe and the other parts of the Severn River system. Between the years 1868 and 1920, some 252,191 pounds of pickerel were reported in the commercial returns of Lake Simcoe (Figure 39). Of this quantity, nearly 80% was taken during the period from 1888 to 1902. After 1902, there was no record of the sale of pickerel for 12 years until some were taken by commercial seines in the Holland River and Cook's Bay between 1915 and 1920.

While these commercial fishing returns attest to the presence of pickerel during the 19th century, they give no indication of the distribution or abundance of this species within the lake. Although no other written reference to this very early fishery has been found, several informants recall that their fathers spoke of the spring spearing of pickerel in the vicinity of the Atherley Narrows and in the Holland River and Marsh.

In the present century, considerable numbers of pickerel were taken in the seines of the carp fishermen in the Cook's Bay and Holland River area. Also,



Figure 39—Commercial fishing returns for yellow pickerel in Lake Simcoe.

local residents speared quantities of pickerel in the creeks and ditches of the Holland Marsh in the spring months. Fewer fish were taken by these methods around the Atherley Narrows. However, in spite of this population of pickerel, surprisingly low numbers of pickerel were taken by angling in Lake Simcoe waters except in local areas, particularly the Atherley Narrows where a few captures were reported between 1904 and 1916 at the spawning season.

The status of the pickerel in Lake Simcoe would seem to have remained relatively unchanged in the years which followed. A considerable population of this fish existed in the lake, as revealed by carp seines, but few were taken by angling. Undoubtedly, greater quantities were taken during the closed season by illegal methods, particularly spearing and snaring, when the pickerel were readily exploited in spawning areas.

During the mid-1930's, a new pickerel run began in the Talbot River into which few, if any, pickerel were known to have come in previous years. The first authentic record of a capture came from the local Conservation Officer who apprehended a pair of men with two large pickerel on an April night in 1938. The numbers of pickerel ascending the Talbot River increased each spring thereafter until a heavy run now offers a spectacular sight which attracts onlookers from many miles distant. The upstream movement of these pickerel is blocked by a control dam of the Trent Canal, below which a great concentration of pickerel occurs. Here are excellent spawning beds for this species. Active law enforcement has been quite effective in the protection of these pickerel which are so readily vulnerable to poachers. A pound net set in the lower river from April 4th to May 4th, 1951, captured 997 mature and ripe fish which were subsequently released and allowed to proceed upstream to the spawning beds. These fish were taken at the end of the spawning run and formed only a low percentage of the total run of pickerel in that year.

Following the opening of the season on May 15th, numerous pickerel are taken by angling. Although most of the pickerel move back into the lake, some pickerel stay in the River and offer mediocre fishing through the summer months. Autumn freshets cause more pickerel to move into the river when the quality of the fishing improves. In the other rivers and streams of Lake Simcoe, pickerel are captured only rarely. While pickerel are still uncommon in the Pefferlaw River, local people are of the belief that the numbers seem to have increased slightly during the past 12 years, some 20-30 pickerel being taken annually.

In the open lake, pickerel are taken occasionally around Thorah and Georgina Islands, infrequently in Cook's Bay, and seldom elsewhere. In spite of the extensive open-water fishery for other species in Lake Simcoe, the pickerel population has remained more-or-less untouched. Evidence of the sizeable numbers of pickerel resident in the lake may be illustrated by the catches of two trap nets set on the north shore of the lake from October 7th to 23rd, 1953, for the purpose of obtaining lake trout spawn. These nets, located on lake trout spawning shoals, captured 1368 pickerel which averaged six to seven pounds in weight.

Between the years 1921 and 1955 (Table VII), a total of 15,605,000 pickerel eyed-eggs and fry were planted in Lake Simcoe.

TABLE VII
PLANTINGS OF YELLOW PICKEREL IN LAKE SIMCOE

YEAR	Number of Eyed-Eggs and Fry	YEAR	Number of Eyed-Eggs and Fry
1921.....	1,000,000	1947.....	600,000
1923.....	100,000	1949.....	600,000
1924.....	1,000,000	1950.....	1,000,000
1929.....	100,000	1952.....	1,000,000
1938.....	500,000	1953.....	3,000,000
1944.....	750,000	1954.....	5,000,000
1946.....	175,000	1955.....	780,000
		Total.....	15,605,000

LIFE HISTORY

Distribution: The yellow pickerel begin to leave the deep water of the lake usually before the ice has left either the lake or the lower parts of the rivers. It is peculiar that significant spring runs of pickerel occur in only two of Lake Simcoe's rivers, the Talbot River and the Holland River.

The first appearance, in the Talbot River, of pickerel occurs in late March when their ascent is stimulated by freshets. The subsequent ascent of considerable numbers of pickerel to the spawning areas below the Trent Canal control dam is correlated with natural freshets or artificial freshets caused by the raising or lowering of the dam. This spring run may last until early May as illustrated by the operation of a trap net in the lower river from April 4th to May 4th, 1951, which captured 997 pickerel representing only a small part of the number of pickerel which moved up the river in that year (see appendix A). Considerable numbers of fish had ascended the river before ice and flood conditions permitted the installation of the net. In most years, many pickerel reach the spawning areas of the Talbot River considerably in advance of the actual spawning period although a few ripe pickerel may move into the stream as late as early May.

The actual spawning in the Talbot River may be interrupted or ended prematurely by the operation of the control dam. As soon as logs are placed in the dam and the water flow is drastically reduced, the pickerel leave the riffle areas and are carried downstream into the series of pools below, or into the lower river. Although new freshets may bring the pickerel upstream to the spawning beds several times, this cannot be relied upon.

Following spawning, usually in mid-April, the pickerel move downstream from the fast water of the spawning areas into the pools below. While a large percentage of the pickerel descend immediately into Lake Simcoe, a number remain in the deeper pools where they offer fair fishing to anglers during the

latter part of May and June. It is of interest that occasionally a few pickerel follow power boats from the lower river through several locks into the interlinking artificial lakes of the Trent canal.

The spring run of pickerel in the Holland River takes place at about the same time as that in the Talbot River. However, this run usually passes unnoticed except by those residents familiar with the Holland River. In the early years of the carp fishery, commercial seines captured considerable quantities of pickerel, some of which were sold. The extent of the run is difficult to ascertain in the muddy sluggish water of the river but is believed to be smaller than that in the Talbot River. Pickerel linger around the Holland River mouth for several weeks before moving out into Cook's Bay. Although few, if any, are taken by angling in the river it is known that some pickerel have been taken by poachers in past years.

After leaving the rivers, the pickerel appear to disperse rapidly to various shoal areas of the lake. For example, a 7-pound pickerel tagged in the Talbot River on May 3rd, 1951, was taken at the mouth of the Pefferlaw River on the 16th of the same month. Although only a few pickerel are actually taken by anglers, the pickerel commonly frequent the sand, gravel and stony shoal areas of the lake until some time in August. Catches of pickerel are reported most frequently from around Thorah and Georgina Islands, Cook's Bay and occasionally elsewhere.

During late August and September, the pickerel appear to migrate into deep water where they are rarely taken by fishermen. This late summer movement is characteristic of the pickerel of other inland waters, for example, Lake Nipigon where they have been taken in quantity by gill-net fishermen in 60 to 90 feet of water (Dymond, 1926).

During the autumn, many of the Lake Simcoe pickerel shift into the shoal areas where they move along the lake shore. Some of these fish are taken each October in Department trap nets set on the lake trout spawning beds. While small numbers of pickerel, usually under 30, are taken almost daily until the nets are removed late in the month, considerably larger numbers are taken from time to time as illustrated by the capture of over 1200 pickerel in four nights of fishing by two trap nets from October 19th to 23rd, 1953. Similar catches occur each autumn. Although present in quantity around certain shoal areas of at least the northern part of the lake during the autumn, the pickerel population is unexploited by anglers.

Through the winter months, numerous pickerel concentrate in a deep hole in Cook's Bay where they have appeared for many years in the commercial carp seines when drawn under the ice. At the north end of the lake, a population of pickerel seems to concentrate each year in the deep water off the Talbot River mouth from where they move readily into the river at the onset of early spring freshets and, to a much lesser extent, late autumn freshets. It has not been ascertained whether or not pickerel concentrate at other locations in the lake during the winter season. In spite of heavy winter angling for other kinds of fish, pickerel are not taken by ice fishermen.

Age and Growth: The growth of Lake Simcoe pickerel compares favourably with that of the yellow pickerel from other waters. The age-length relationship of male and female pickerel is given in Figure 40.

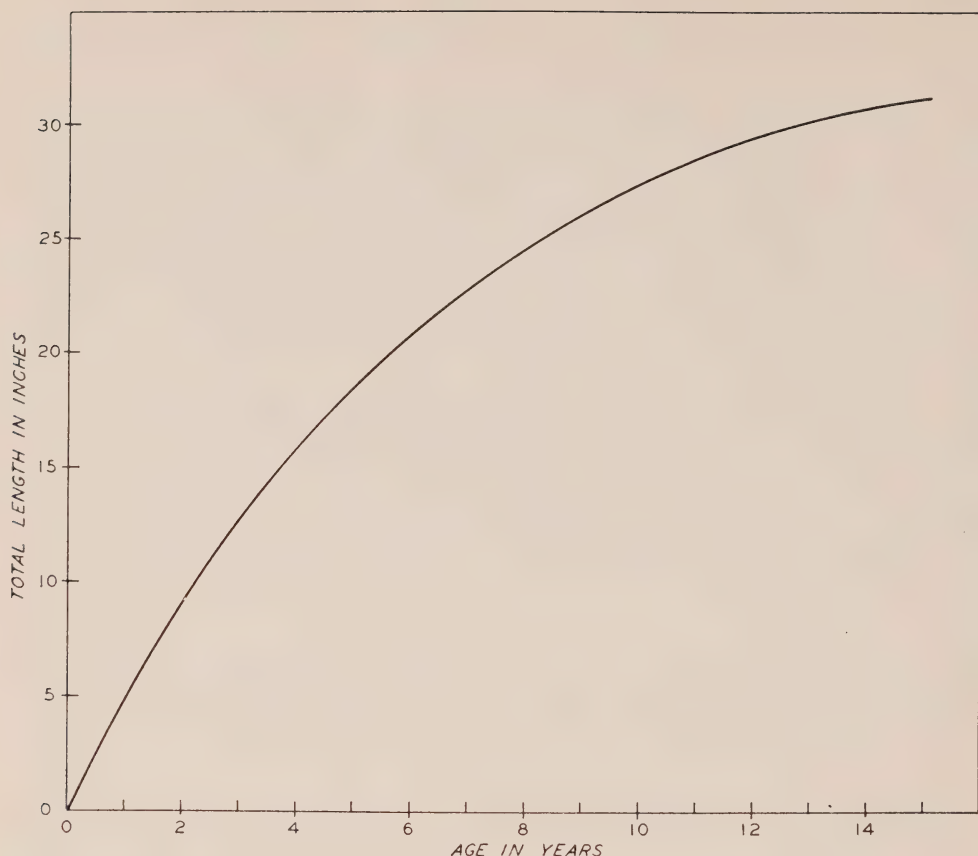


Figure 40—Growth curve of yellow pickerel in Lake Simcoe.

The young-of-the-year fish attain a total length of four to six inches by the end of the first summer. Most of these fish have reached a length of 15 inches and a weight of about one pound at the age of five years, and those reaching the spawning beds at this age are sexually mature. At 10 years of age, the pickerel average 26-28 inches in length and 7-8 pounds in weight. Older pickerel add length more slowly but continue to gain in weight and by 15 years of age are some 30 inches in length and weigh about 17 pounds. While specimens of this size are rare and no fish of greater size have been studied, one pickerel weighing 22 pounds was reported to have been speared in the Holland River in 1914.

Breeding Habits: The spawning of pickerel in the riffle areas of the Talbot River is a spectacle witnessed by many people during April of each year. These fish, which move into upper part of the river during spring freshets and often considerably in advance of the spawning period, begin to spawn when the water has warmed to about 45-48 deg. F. and spawning may continue until the water temperature approaches 60 deg. F. The pickerel spawn in the fast water from six inches to over three feet in depth where the bottom is characteristically of

coarse gravel and rubble. They frequent the fast water areas almost exclusively whether spawning or not except when the flow is reduced significantly by a drop in flow over the Talbot River dam. Spawning is then halted abruptly as all pickerel drop into pools below. While strong freshets may bring these pickerel back to the spawning beds, the fish may continue downstream to the lake if late in the season. The spawning act is carried out in broad daylight as well as during hours of darkness in the Talbot River. Egg production may vary from 20-30,000 eggs in young females to over 300,000 in 8 to 10-pound fish.

The amount of spawning on the extensive areas of gravel and stony shoreline of Lake Simcoe has not been determined but is believed to be considerable in view of the numbers of pickerel in these shoal areas. These pickerel appear to move into deeper water during the daylight hours and approach the shoal areas to spawn at night. While several local people attest to witnessing pickerel in the act of spawning along the grassy banks and in the small tributaries of the lower Holland River, the author can verify only the presence of quantities of mature pickerel in these areas at the time when pickerel are spawning elsewhere.

FOOD

The pickerel of Lake Simcoe are extremely well nourished as demonstrated by their excellent growth and quality. The young-of-the-year pickerel feed primarily on young suckers, perch, minnows, other small fish, crawfish, frogs and insect larvae. Those fish found most commonly in the stomachs of adult pickerel in approximate order of importance include the yellow perch, white sucker, freshwater herring, lake emerald shiner, sunfish, rockbass, logperch, sticklebacks, darters and miscellaneous species. Other common items of food are crawfish, frogs and aquatic insects. The feeding habits of the pickerel vary both locally and seasonally in accordance with the availability of these preferred food species.

ANGLING

The greatest angling pressure occurs in the Talbot River at the opening of the fishing season in mid-May when numerous adult pickerel are usually still in the rivers. However, this fishery dwindles rapidly in the weeks that follow. Similarly, the autumn run of pickerel into the river attracts numbers of fishermen to the river banks. While the pickerel are captured on such artificial lures as spoons, plugs, or spinners with worms, this equipment appears to be used quite commonly in the upper part of the river to snag pickerel rather than catch them in a legitimate manner. This poses a problem in law enforcement. Pickerel fishing is of poor quality in the Talbot River at other times of the year. Pickerel are captured only rarely in the Holland or other rivers of Lake Simcoe.

Pickerel are taken in the open lake occasionally during the summer on small-mouth bass baits, particularly while still-fishing with live minnows, frogs or worms. A few are taken by casting or trolling in shoal areas with artificial lures. Actually, however, there is no pickerel fishery in the lake as efforts of fishermen to locate and exploit the pickerel population have been unsuccessful. The failure of anglers to harvest the pickerel is indicated by the recovery of only one of some 500 fish tagged in the Talbot River during April of 1951.

REGULATIONS

Although a closed season extended from April 15th to May 15th as early as 1889, no other restrictions were placed on the angling of pickerel until 1900 when a legal fork length of 12 inches and a daily possession limit of 20 pickerel was imposed. In 1910, the legal length was raised to 15 inches, and the possession limit lowered to 12 fish per day. In 1922, the closed season was changed to the period from April 15th to April 30th but was further modified to read from April 1st to May 15th in 1932 while the daily possession limit was reduced to 8 fish in the interim.

Since 1940, the closed season has extended from January 1st to mid-May, the fishing season now opening on about May 15th. Although legal lengths were abolished for a few years previous to 1942, a legal fork length of 13 inches was imposed in that year and remained unchanged until 1954 when a total length of 14 inches was adopted. Daily catch limits have remained at 6 pickerel per day although, in 1954, total possession by individuals was lowered from a two to a one-day's catch.

MANAGEMENT

The outstanding problem of management is to determine a means by which the pickerel population of Lake Simcoe may be harvested by summer angling while in the open lake. Legal angling harvests quite inadequately the spring and autumn runs of pickerel in the Talbot River while there is no significant fishery in the lake.

The extent of natural reproduction in Lake Simcoe waters makes the planting of pickerel in the lake unnecessary. While it is possible that plantings of pickerel at the north end of the lake may have contributed to the spectacular increase in the extent of the pickerel runs into the Talbot River during the past 15 years, it has been clearly established that a considerable population of pickerel was native to Lake Simcoe where pickerel were taken in carp seines and by spearing, but infrequently by angling. Annual pickerel plantings should be discontinued and no further consideration given to a restocking programme at least until anglers have learned to use fully those pickerel provided by nature.

Present creel limits on the angling of pickerel in Lake Simcoe are not a biological requirement as long as the population of this fish remains more-or-less unexploited. The abolishment of legal lengths in 1955 has been a desirable step in management. While the creel limit of 6 pickerel per day is inconsistent with the need for a greater utilization of the fish production, this quota is seldom reached by legal angling and does not lower significantly the catches of pickerel.

The closure of Lake Simcoe waters to the angling of pickerel from January 1st to May 14th is not required to ensure adequate natural reproduction at the present low level of utilization. However, the closed season is of value to conservation officers in the control of spearing and other methods of poaching in the Talbot River and possibly the Holland River where the pickerel are considerably more vulnerable to illegal fishing than to legitimate angling. In these rivers, the threat of a heavy penalty for the illegal possession of pickerel

is often a deterrent to poaching. The establishment of a fish sanctuary has been given consideration as a means to provide a more effective control over the poaching of spring-run pickerel.

The abolition of all controls on the angling of pickerel in Lake Simcoe waters would be a desirable step towards more effective management, but could not be expected to result in an adequate harvest of the pickerel population until successful methods of angling for pickerel in the open lake have been developed. As the sole value of the fisheries regulations lies in the assistance given to enforcement officers who strive to curb unethical fishing, this phase of management should be considered when any relaxation in controls is contemplated.

The behavior and welfare of those pickerel ascending the Talbot River is dependent on the flow of water over the Talbot River dam. The fluctuations in the river flow caused by the operation of this dam are not always in the best interests of the fishery and have caused considerable public indignation in recent years. It should be noted that this control dam was built and in operation by the Department of Transport many years before the spectacular appearance of pickerel in the Talbot River dam. Although it is expected that a closer co-operation between the two Departments may result in more effective fisheries management, the control of water levels is a necessary function and, unfortunately, its relation to the pickerel fishery must be a secondary consideration.

In view of the failure of anglers to harvest adequately the Lake Simcoe pickerel population, it is reasonable that controlled numbers of pickerel may be taken from the Talbot River each year for transplanting to other suitable waters where they would make a much greater contribution to the sport fishery of southern Ontario.

THE SMALLMOUTH BASS

The smallmouth bass, *Micropterus dolomieu*, is one of the more important Lake Simcoe fishes. Although now highly prized as a game fish by the angler, it was at one time taken by commercial methods and sold legally on the fish markets. Between 1868 and 1901, some 789,000 pounds of Lake Simcoe bass were marketed, Figure 41. After that time, the demands of sport fishermen resulted in the enactment of legislation which recognized it solely as a game fish. As the early commercial returns failed to differentiate between smallmouth and largemouth bass, it would seem probable that the latter species may have been included in the reported catch, particularly in the Cook's Bay area where a fair population of largemouth bass was present.

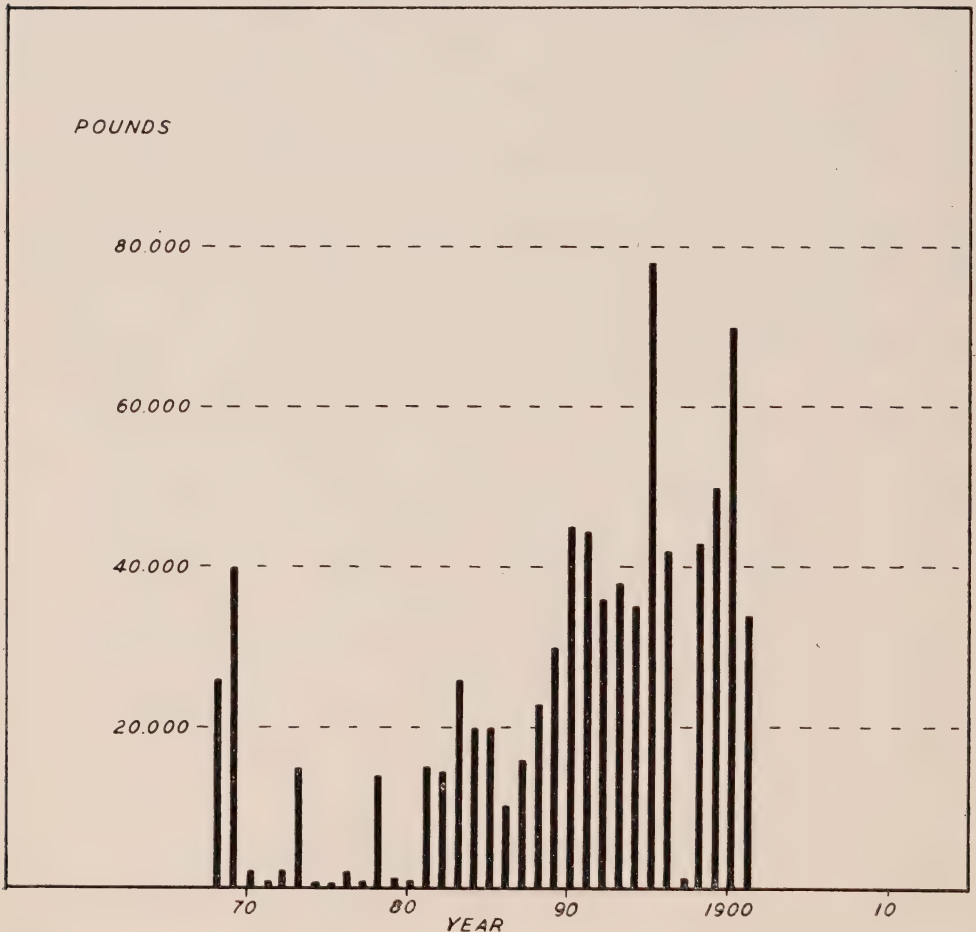


Figure 41—Commercial fishing returns for smallmouth bass in Lake Simcoe.

Early references suggest that the native Indians pursued the smallmouth bass in Lake Simcoe. However, the only known authentic observation was made by Bond (1838) who noted that on May 26, 1815, while riding with an Indian family (man, wife and four children) in a canoe paddled by the squaw "the Indian stood up all the time looking for fish . . . he killed three bass, turning round the spear each time to the squaw in order that she might extricate the fish."

The Lake Simcoe sport fishermen did not come to recognize the possibilities of the smallmouth bass fishery until late in the 19th century. The Tourist's Guide of 1866 commented that there were a few bass to be had around Fox Island, but implied that the sportsman should not bother to unpack his rod there. However, there was apparently no scarcity of bass in Lake Simcoe as indicated by the commercial returns of that time.

By 1890, a considerable sport fishery for smallmouth bass had developed in the Orillia-Brechin area, in the Beaverton-Island Grove area around the islands, and in the vicinity of Big Bay Point. Bass fishing continued to gain in popularity until, by 1900, its value as a tourist attraction became recognized in the Orillia area. At this time, large specimens of smallmouth bass were shipped to several American cities in an attempt to entice summer visitors to the lake. The fishing continued to be good and the fisheries overseer at Uptergrove stated that, in 1904, "the bass fishing could not be excelled in the whole of Canada." Excellent fishing was still reported in 1907, and again in 1916 in all bass grounds of the lake except Kempenfeldt Bay.

At this time when public interest in the smallmouth bass fishery was high, there came the first plantings of this species in Lake Simcoe water. In 1901, some 1,290 parent smallmouth bass were planted at three locations in the lake. These were Lake Simcoe's share of 9,481 parent bass distributed to 18 points in the Province in specially designed railway cars. In 1904, a planting of 785 parent fish was made at Jackson's Point. In 1906, a further planting of 1850 adult fish ended the practice of stocking parent fish in these waters. No other plantings of smallmouth bass were made in Lake Simcoe until 1916 when 200,000 fry and fingerlings were stocked. (The Government had adopted the practice of planting young bass following the successful rearing of bass in a pond at Brantford in 1911.) Between the years 1916 and 1955 (Table VIII), a total of over 1,000,000 young smallmouth bass were distributed in Lake Simcoe waters.

Although the quality of the smallmouth bass fishery was described in glowing terms between 1900 and 1916, there were ups and downs in the fishery during the next 50 years. While fluctuations in the quality were reported from the various fishing centres from year to year, it was seldom that reports from all around the lake were in agreement whether it had been a good fishing year or not. These accounts, therefore, are of little value in determining the trend of the fishery. These annual fluctuations in the fishery, noted by the fishermen, may have resulted from the single or combined effect of two factors: either a fluctuation in abundance between low and high population levels of bass, or the failure of fishermen to adequately exploit the bass population present.

TABLE VIII
PLANTINGS OF SMALLMOUTH BASS IN LAKE SIMCOE

YEAR	Parent Fish	Fry and Fingerlings	YEAR	Parent Fish	Fry and Fingerlings
1901.....	1,291	.....	1939.....	....	40,750
1904.....	785	.....	1940.....	....	4,000
1906.....	1,850	.....	1941.....	....	5,200
1916.....	200,000	1942.....	....	4,000
1917.....	100,000	1943.....	....	1,500
1920.....	20,000	1944.....	....	23,000
1921.....	25,000	1945.....	....	500
1922.....	5,000	1946.....	....	7,500
1923.....	5,000	1947.....	....	33,000
1924.....	2,500	1948.....	77	1,500
1925.....	150,000	1949.....	....	30,000
1926.....	500	1950.....	....	120,000
1929.....	1,000	1951.....	....	37,000
1930.....	10,000	1952.....	....	4,800
1931.....	10,000	1953.....	....	83,500
1932.....	500	1954.....	....	48,000
1934.....	1,000	1955.....	....	6,750
1937.....	51,000	Total.....	....	1,043,500
1938.....	11,000			

Westman (1949) cautioned against the interpretation of poor angling returns in Lake Simcoe as conclusive evidence of a population scarcity of bass, a conclusion which Rawson (1930) drew following evidence of poor fishing quality in the 1920's. Interviews with long-experienced fishermen have revealed that at no time in their memories did the population of bass become so low that quantities were not taken by persistent fishermen in some section of the lake. Further, the observations of Westman (1949), the author and many fishermen are in agreement that at those times, either annual or seasonal, when local bass fishing has been considered poor, it was not unusual to see a remarkable number of bass along the shore and shoal areas.

While it is most probable that there have been significant fluctuations in the smallmouth bass population in Lake Simcoe during the past 50 years, it is impossible to ascertain these changes from the reports of anglers who indicate only the abundance of their catches and the size of the fish taken. Even anglers' reports on fishing quality may be often unreliable as poor catches are often emphasized, but good catches taken for granted. However, in spite of various complaints of mediocre angling and dismal predictions for the future of the bass fishery which have been voiced through the years, the Lake Simcoe smallmouth bass population has continued to thrive. In 1953, few local fishermen could recall having ever observed greater numbers of bass than in that year. Most of these fishermen expressed the belief that the smallmouth bass was difficult to capture regardless of its abundance, except in specific areas and at certain times of the year. Capable fishermen around the lake were generally satisfied with their catches, and reported a greater percentage of large bass among the legal-sized fish than in the previous two or three years. Good fishing has continued until time of writing in 1955.

While the greater part of the spawning areas of the smallmouth bass lies in the lake, the spectacular annual spawning runs of numerous bass into the Pefferlaw River, and other rivers on the east and north shores, are witness to the numbers and quality of the smallmouth bass in Lake Simcoe.

LIFE HISTORY

Distribution: During May and June, the smallmouth bass become concentrated on various shoal areas of the lake and in several rivers where they spawn. If spawning is late, there are often numerous bass (particularly male fish) still in the rivers with the opening of the fishing season on July 1st. However, by this time the bass population has become widely distributed around the sand, gravel, and stone shoals or reefs where they are fished by anglers at shallow to moderate depths up to about 20 feet in most years. Some bass are taken by angling in the rivers early in the season.

Most of the smallmouth bass captured by anglers during the open season (July 1st to October 15th) are taken around shoals, reefs, wharf cribs and weed beds. There is a considerable diurnal and seasonal local movement of bass which has a significant influence on fishing quality. Considerable fluctuations in fishing quality would seem to be caused primarily by this local shift of bass and variations in the abundance of natural food.

Although there are authentic records of the capture of smallmouth bass beneath the ice, they are seldom taken during the closed season by anglers after other species of fish. The distribution of smallmouth bass from late autumn through the winter months until their reappearance in the shoal areas and rivers the following spring remains a matter of speculation.

Age and Growth: The growth of smallmouth bass in Lake Simcoe is enhanced by an abundance of food so that many bass have reached the legal length of 11 inches by the autumn of their third year. The average age-length relationship of the bass population in late summer is given in Figure 42. While Westman (1949) observed slightly different rates of growth in smallmouth bass taken from different parts of the lake, there is no apparent difference in growth rates of male and female fish. By the fifth year, the bass are usually a pound or more in weight and by the 10th year weigh upwards of four pounds. Fish within this size range comprise of high percentage of anglers' catches. Smallmouth bass over five pounds in weight are prized highly by anglers.

Breeding Habits: The smallmouth bass spawn on the shoal areas of Lake Simcoe and in certain of the tributary streams, particularly the Pefferlaw, Sutton, Beaverton, and Talbot Rivers.

Spawning occurs generally when the water reaches 60-65 deg. F. during late May or early June, the actual time varying from year to year and occasionally being delayed even until the end of June or early July by unseasonably cold weather. In the lake, spawning nests are made on various gravelly shoals which border the islands and mainland. These nests have been observed in up to 10 feet of water. In the rivers, large numbers of bass move upstream until the presence of dams bars further ascent. Here they spawn in the gravel and stony areas of moderate current where they may be observed readily by

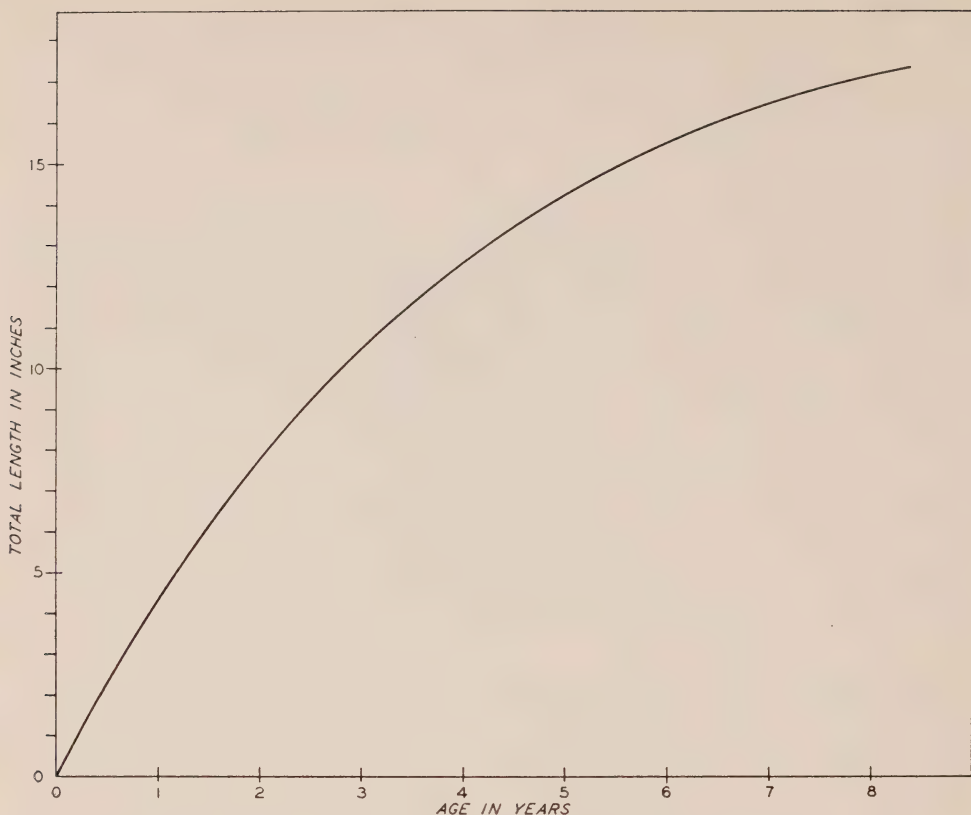


Figure 42—Growth curve of smallmouth bass in Lake Simcoe.

walking along the river banks. While mature bass of about 10 inches in length have a potential of some 2000 eggs, the large fish of 18 inches or more may lay upwards of 10,000 eggs.

The female bass leave the spawning areas of the rivers soon after laying their eggs and leave the male fish to guard the eggs and young fish which hatch shortly. Although female bass are taken by angling in early July near the spawning areas of the lake, they show no interest in the welfare of their progeny. The newly-hatched bass soon use up the food provided by their yolk-sacs and must move away from the nests in search of food. These fish travel in schools under the protection of the male parent bass until several weeks of age.

FOOD

The young-of-the-year bass feed on microscopic animals until they become large enough to prey upon aquatic insects, crustaceans, amphibians and small fish. While perch were the most common fish in those bass stomachs examined, other common species included trout perch, log perch, darters, sculpins, minnows and the young of suckers, sunfish, and rock bass. Crawfish appear to be the

most important single item of food while the bass are on the stony shoals of the lake. Mayflies are eaten during their emergence in early summer. Frogs and insects are apparently a preferred food of the bass when available but constitute only a minor part of their diet.

ANGLING

While the greater number of smallmouth bass are taken by angling from anchored boats with live minnows, crawfish, frogs, worms and other live baits, numerous fish are captured on artificial lures by casting and trolling. The fishery is concentrated around the shoals and reefs of the lake although some bass are taken in the rivers early in the season. The rather extensive areas of suitable bass habitat around Fox, Snake, Georgina, Thorah, and the smaller islands make these popular fishing grounds.

REGULATIONS

As early as 1889, a closed season which covered the period from April 15th to June 15th had been established. This was extended to June 19th in 1892 at which time a length limit of 10 inches had been imposed with a daily creel limit of 12 smallmouth bass. In 1893, the closed season was further modified to include the period from May 10th to the 30th of June. In 1913, it reverted to the dates of April 15th to June 15th. From 1916 to 1921, the closed season was from January 1st to June 15th with a creel limit of 8 bass per day. In 1916, the closed season dates were changed to read December 1st to June 30th but the following year saw a further advancement of the closed season to October 1st and a lowering of the daily creel limit to 6 bass. The closed season was modified again in 1931 to include the period from October 16th to June 30th and has remained unchanged for Lake Simcoe since that time. Although the creel limit has remained unchanged for many years at 6 smallmouth bass per day, a change in the legal method of measuring Ontario game fish resulted in a change in the legal length of bass from 10 inches fork length to 11 inches total length.

MANAGEMENT

The present creel limit of six smallmouth bass per day per angler, based on the assumption that this control assures a fair distribution of the bass harvest among anglers, allows fishermen an adequate daily catch for home consumption. While there is no suggestion that the smallmouth bass population which has thrived through the history of the fishery (even when subjected to an active commercial fishery) can be overfished by legal angling, a control on the capture and ultimate misuse of excessive quantities of bass by unscrupulous fishermen has definite ethical value.

The total length limit of 11 inches allows most of the smallmouth bass in Lake Simcoe to mature before entering the fishery. In consideration of the high utilization of the extensive spawning areas and the presence of many older fish on the spawning grounds, there is no indication that this protection is required to ensure adequate natural reproduction. Anglers who prefer to make up their quota of bass with fish under 11 inches in length could be allowed to do

so with no threat to the welfare of the fishery. While the abolishment of length limit controls on smallmouth bass in Lake Simcoe would allow a more efficient harvest of the annual bass production and result in greater angling success, a relaxation in this control should not be considered unless existing or modified creel limits are retained.

The closed season on smallmouth bass (October 16th to June 30th) covers adequately the spawning period in most years although some male bass may be taken while guarding the young-of-the-year after the opening of the fishing season. However, in cold years, some ripe female bass may still be found on the spawning beds of the river in early July but, at the present population level, exploitation of these fish is of little consequence. An extension of the fishing season from October 15th to December 31st to coincide with the closing date for yellow pickerel would be in order if there is sufficient interest in the fall fishing among anglers.

The planting of fry and fingerling smallmouth bass in Lake Simcoe has been given a thorough trial with the stocking of over $\frac{3}{4}$ million young hatchery fish since 1916, but there has been no correlation of stocking effort with the periodic fluctuations in fishing quality through the years. Annual plantings of smallmouth bass (representing the reproductive potential of perhaps 25-50 female fish in nature) cannot be expected to affect noticeably either the fish population or angling success in the waters of Lake Simcoe where natural reproduction is of high magnitude. Unless abnormal and unprecedented biological or ecological factors should cause the population of smallmouth bass to drop to a level infinitely lower than that ever occurring in the recorded history of the fishery, restocking with hatchery fish may be discontinued as a management practice.

The establishment of fish sanctuaries in the smallmouth bass spawning areas of the Beaverton, Pefferlaw, and Sutton Rivers of Lake Simcoe has been a recent management procedure. The closure of these areas to all fishing between May 15th and June 30th has been of considerable assistance to conservation officers in curtailing poaching while the bass are concentrated on the shoal areas. Consideration should be given to an extension of the closed period until all spawning has been completed, the eggs hatched, and the parent males have completed their guardianship of the young bass. The eventual establishment of permanent smallmouth bass sanctuaries in these and other rivers would seem to be sound management.

The future management of the smallmouth bass fishery entails a better utilization of the fish production by anglers to whom the seasonal and annual variations in the availability and susceptibility of the smallmouth bass often present a false appearance of scarcity.

THE LARGEMOUTH BASS

HISTORY AND STATUS OF FISHERY

The largemouth bass, *Micropterus salmoides*, has been of very minor importance in the Lake Simcoe fishery. While it is true that from time to time quantities of largemouth bass have been caught accidentally in the commercial carp seines operated in the Holland River and Cook's Bay, only small numbers have been taken by hook and line. It is possible that a few largemouth bass were included in the 724,000 pounds of bass reported to have been taken from Lake Simcoe during the fourth quarter of the past century.

The distribution of largemouth bass within the waters of Lake Simcoe has remained restricted largely to the Cook's Bay area where its numbers would seem to have varied little during the past 50 years. Elsewhere in the lake, largemouth bass are generally scarce, or absent. There is no record of the capture of largemouth bass in either Kempenfeldt Bay or along the east shore of the lake to the north of Roches Point. Captures along the north shore of the lake are infrequent.

Between the years of 1935 and 1955, some 51,000 largemouth bass were stocked in Lake Simcoe as reported in Table IX.

TABLE IX
PLANTINGS OF LARGEMOUTH BASS IN LAKE SIMCOE

YEAR	Number of Fry and Fingerlings
1935.....	15,000
1937.....	15,000
1946.....	500
1949.....	20,000
1955.....	500
Total.....	51,000

LIFE HISTORY

Distribution: The largemouth bass prefer the shallow areas of the lake where there is an abundance of plant growth. Consequently, they are restricted more-or-less to the Cook's Bay area of the lake, although appearing occasionally near the weed beds elsewhere.

While the very young bass remain in schools, the larger fish are more solitary and commonly frequent weedy areas in 3-8 feet of water. Adult largemouth bass which move into the Holland River and other weedy shoal areas during the spring are found in water up to depths greater than 10 feet during the summer months. They appear to hibernate on the muddy bottom in the winter and are not captured by ice fishermen.

Age and Growth: The largemouth bass of Lake Simcoe reaches the legal length of 11 inches usually during its 4th or 5th year of life by which time it has become sexually mature. At age five, the average total length is about 14 inches and the weight about $1\frac{1}{2}$ pounds. At 10 years, the length approximates 18-19 inches and the weight between 3 and 4 pounds. A 21-inch, 5-pound largemouth bass was aged at 14 years. The average size of the few bass of this species taken by angling is one to three pounds. The growth curve shown in Figure 43 is based on scale readings made on only a small number of largemouth bass.

Breeding Habits: The adult largemouth bass approach the sand and mud shallows of Cook's Bay, the Holland River, the Holland Marsh and probably the Jersey River, where spawning takes place in early June when water temperatures are usually in the mid-60's. Spawning must also take place in those other local areas of the lake offering suitable habitat.

Nests are scoured out among the bulrushes, other aquatic vegetation, and etritus of the soft bottom. Numerous eggs are deposited which seem to adhere to the nest until hatching time. Although the actual spawning of the

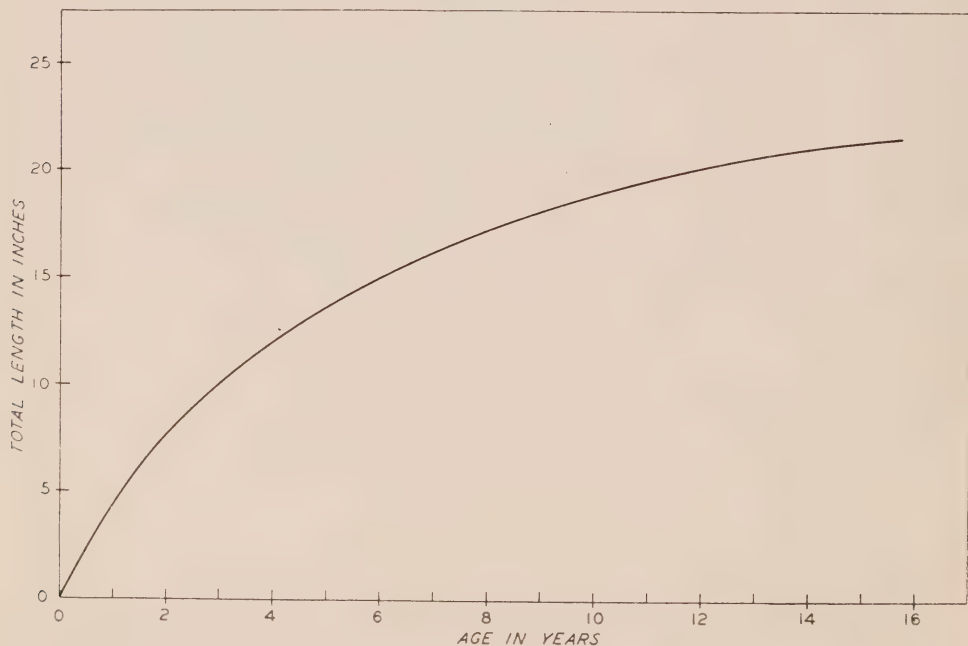


Figure 43—Growth curve of largemouth bass in Lake Simcoe.

largemouth bass was not observed, the eggs are believed to hatch in about one week or less. The newly-hatched fry remain in the nest for about another week at which time they are guarded by the male parent who continues his vigilance after the young leave the nest and swim about in schools. These schools seem to break up when the young fish are one to two inches in length. After that time, the largemouth bass become difficult to observe although 3-4 inch fish were taken in shallow water.

FOOD

The largemouth bass feeds on most kinds of aquatic animals which are of suitable size. It feeds at the surface, on the bottom, and at any intermediate depth and actively pursues its prey.

Young bass of two to four inches in length were found to eat aquatic and surface insects and very small fish. The food of adult bass is primarily fish although considerable quantities of frogs, crawfish, worms, and insects are eaten when available.

ANGLING

Relatively small numbers of largemouth bass are taken by conventional angling with worms, live minnows, and artificial lures but the fishery offers a minor contribution to the Lake Simcoe sport fishery at the present time.

REGULATIONS

The largemouth and smallmouth bass are grouped together under The Ontario Fisheries Regulations as "black bass". The history of pertinent legislation may be found in the outline given for the smallmouth bass.

Present regulations impose a closed season from September 16th to June 30th following, a possession limit of 6 largemouth bass, and a legal total length of 11 inches.

MANAGEMENT

The population of largemouth bass at the Cook's Bay end of Lake Simcoe is greater than is indicated by the low angling success. This was the case even in the earlier years when carp seiners netted quantities of largemouth bass but few were taken by angling. The problem would seem to be to effect a better harvest of the present largemouth bass population by angling.

There is considerable habitat suitable for reproduction, survival, and feeding of the largemouth bass within the lower Holland River and Cook's Bay. Under these conditions the bass population has been sustained at an unknown level and restocking would not be expected to improve the fishery substantially although several plantings were made between 1935 and 1949. Improved environmental conditions in the upper Holland River resulting from the flood conditions of late 1954 indicate the desirability of plantings of largemouth bass in 1956 only to aid natural reproduction in re-establishing a population.

Present restrictions concerning legal lengths and creel limits serve no useful purpose in view of the negligible largemouth bass fishery and it is very doubtful that these bass require the protection given by the closed season.

While anglers should be encouraged to harvest as many largemouth bass as possible, it must be realized that the unsuitable habitat conditions which prevail over most of Lake Simcoe for this species limit its distribution to very local areas. A developed fishery would be worthwhile only in the Cook's Bay area where sport fishermen are now dependent on the pike, perch, pan and coarse fish during the summer months.

THE SUNFISH

The smallmouth and largemouth bass are the only large representatives of the sunfish family present in Lake Simcoe and are discussed separately in the preceding pages on account of their importance in the sport fishery. The smaller members of the family which are familiar to most fishermen are the pumpkinseed, *Lepomis gibbosus*, and the rock bass, *Ambloplites rupestris*.

Like all members of the sunfish family, the pumpkinseed and rock bass are warm water fishes which spawn in early summer and build nests in the running waters of the rivers or on the shoals of the lake. The abundance of young sunfish are excellent forage for other fishes and are themselves heavy predators on young fish, aquatic insects, and other invertebrate life. Although these fish, particularly the rock bass, may grow to some 10 inches in length, their value as pan fish is not recognized by most bass fishermen who usually regard them as a nuisance.

The growth curve for the pumpkinseed is given in Figure 44. The young fish grow 2-3 inches the first year and by maturity in the third year are upward of 5 inches in length. The rock bass have a similar growth curve but grow more rapidly, reaching lengths of 7-9 inches and weights up to a half-pound by the 4th and 5th years, although larger fish are uncommon.

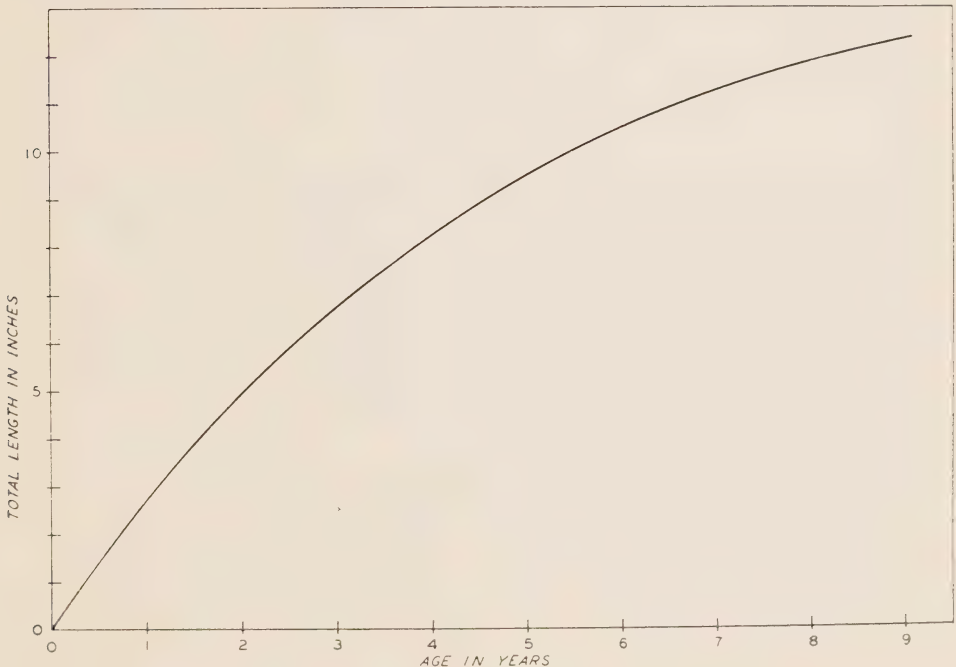


Figure 44—Growth curve of the pumpkinseed in Lake Simcoe.

The sunfish are captured easily on simple tackle when baited with a worm or almost any substance. Consequently, they provide good recreational fishing to children and novice anglers and a ready source of food to those who regard them as excellent pan fish. Some fishermen derive considerable sport from the fishing of sunfish with light fly tackle and spinning gear.

In view of the large population of these smaller members of the sunfish family in Lake Simcoe and the excellence of their flesh as food, fishermen should increase greatly the harvest of these species.

THE BURBOT

HISTORY AND STATUS OF FISHERY

The burbot or ling, *Lota lota lacustris*, is a native to Lake Simcoe waters but is seldom in evidence except during the winter months when numbers of this fish may be observed beneath the ice and quantities are taken accidentally by winter fishermen. The burbot is considered to be generally of no commercial or sport value and is regarded by fishermen as an undesirable resident of the lake. However, small numbers of burbot are eaten by a few fishermen who recognize the excellence of its flesh.

As the population of burbot in Lake Simcoe has remained unexploited through the recorded history of the fishery, there is available no report of annual catches. The population of burbot would appear to have continued quite stable during the years as no records of spectacular fluctuations have been noted. The early recognition of an appreciable population of burbot in 1903 is apparent by the action of the Ontario government which granted three applications for nightlines in order to reduce the numbers of burbot and coarse fish. During the next 30 years, a number of licences were issued for this purpose although observers of the period noted that the licences were greatly abused by taking other more desirable kinds of fish. A programme for the removal of burbot by netting was begun by personnel of the Fish and Wildlife Division during the winter of 1952-53 and expanded during the winter of 1953-54 when some 2,800 burbot were removed from rivers tributary to Lake Simcoe.

A paper following a study of the life history and winter habits of the burbot of Lake Simcoe has been published in the Canadian Fish Culturist (McCrimmon & Devitt, 1954).



Figure 45—A burbot is opened to show stomach contents and egg production of a female fish previous to spawning in January.

LIFE HISTORY

Distribution: The burbot, like the lake trout, seeks the cool deep waters during the warm summer months but at other seasons of the year is widely distributed at all depths. In the winter, numerous burbot are attracted to the sport fishing grounds by the practice of fishermen of pre-baiting for whitefish and are then captured in the greatest quantities by anglers who consider them to be a great nuisance. Numbers of burbot move into the larger river mouths and shallow bays under the ice where they feed extensively after spawning in January.

Age and Growth: The rapid growth of the Lake Simcoe burbot reflects its voracious appetite. The young burbot, hatching in late winter or early spring, reach lengths of 5 to 8 inches during the first growing season. By their fifth year, they measure about 20 inches in length and 2-3-pounds in weight, and by their 10th year, 30 inches in length and 7-8 pounds. The largest burbot aged was a 13-year-old female with a length of 33 inches and a weight of 9½ pounds. The growth rate for the burbot is given in Figure 46.

Breeding Habits: The greater proportion of the male and female burbot of Lake Simcoe mature in their third year of life. The smallest mature female captured measured 13½ inches, weighed 24 ounces, and carried some 45,600 ripe eggs in early January. The quantity of spawn increases considerably with the growth of the burbot as shown by an 8-year-old female which contained 1,018,050 eggs, representing 22% of its pre-spawning weight.

The burbot spawn during the period between January 15th and 31st in Lake Simcoe. While it is probable that a few burbot may spawn in the rivers, the majority spawn on gravelly shoals of the open lake.

FOOD

The most common items in the winter food of the burbot are the yellow perch, freshwater herring, and lake emerald shiner. The pumpkinseed, common sucker, rockbass, smallmouth bass, whitefish and minnows are other species commonly eaten. Crayfish and caddisflies appear occasionally in the stomachs. Salted minnows and other substances used in the baiting of whitefish appear regularly in those burbot taken near fishing grounds. Numerous burbot move in and out of river mouths in search of food during the winter months while others frequent the open lake.

A preliminary study of the summer food suggests that the principal items of food are still the freshwater herring, lake emerald shiner, and yellow perch while the young of most species of sport fish are eaten when available.

The voraciousness of the burbot is shown by the great numbers of fish appearing in individual stomachs at one time. For example, stomachs have been found to contain as many as 101 small yellow perch, or 11 eight-inch freshwater herring, or 135 young sunfish.

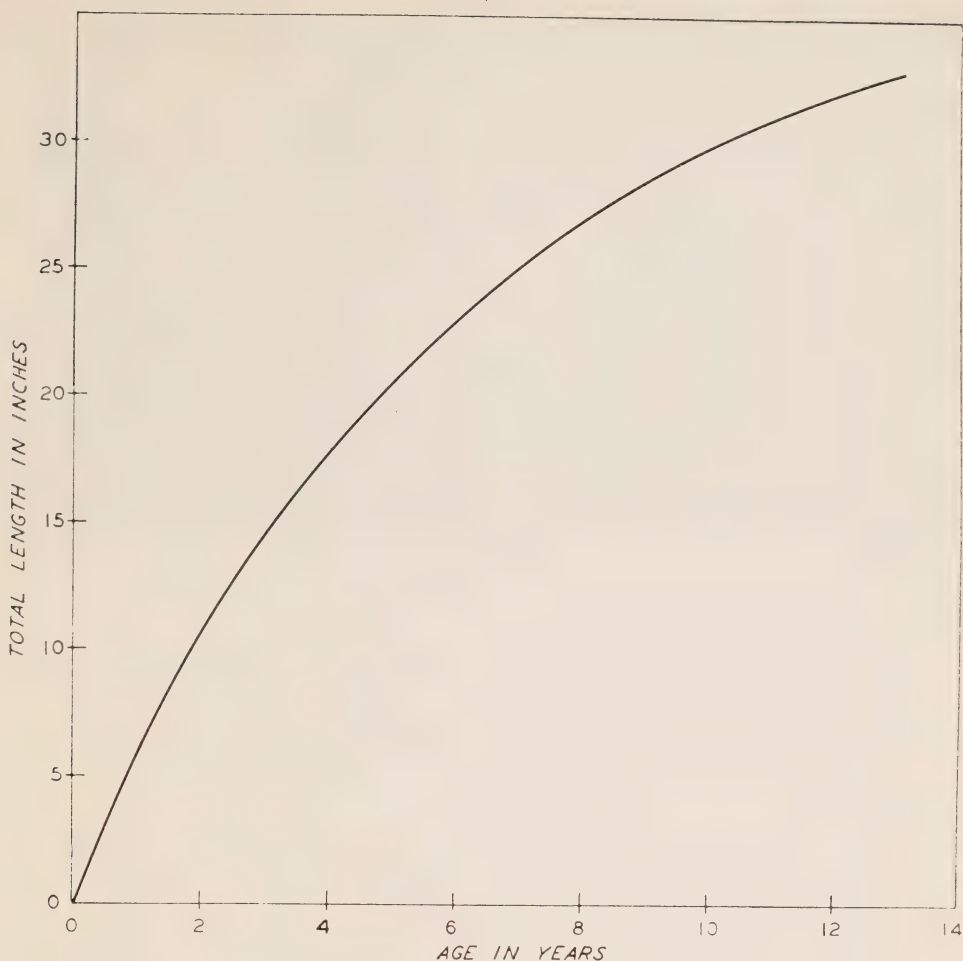


Figure 46—Growth curve of the burbot, or ling, in Lake Simcoe.

ANGLING

Although there is no sport fishery for burbot and anglers generally deplore this fish, quantities are taken by winter ice fishermen while angling for the various sport fish. The rather repulsive appearance of the burbot has caused fishermen to ignore its flesh, although actually of excellent quality when filleted. Many burbot may be found scattered on the ice near fishing huts by the end of the fishing season although an odd one is taken for home consumption and others are collected for use as animal food by local fur ranchers. Ground burbot flesh has been found to work very satisfactorily for the baiting of whitefish.

REGULATIONS

Nightline licences were issued in attempt to reduce the population of burbot for a few years after 1907. However, it was found that more whitefish than burbot and other coarse fish were taken and the practice was discontinued.



Figure 47—The winter harvest of burbot by means of hoop nets.

The capture of burbot by netting has been limited for many years to the holder of commercial fishing licences, although there is no market for this species.

There are no restrictions on the angling of burbot in Lake Simcoe waters.

MANAGEMENT

The burbot population of Lake Simcoe is unexploited by commercial and sport fishermen, the only captures being those taken more-or-less accidentally by fishermen seeking other species of fish. It competes with the lake trout and other sport fishes for food and preys heavily upon the young of most fishes at some time of the year. It is unfortunate that the burbot and its flesh are held in low regard by most fishermen who waste those fish captured, although dietetic studies have shown the fillets of burbot to have good nutritional and culinary qualities (Prov. of Ontario, 1933).

Effective management of the burbot requires a substantial harvest of the annual production. In the absence of an active sport or commercial fishery, the Department initiated a programme in 1953 whereby quantities of burbot are harvested through winter netting under the ice. The immediate problem is the efficient use of the harvest, totalling over 13,000 pounds in 1954. Competition with marine species, such as the cod, which are marketed in quantity at low prices hampers the profitable disposition of the Lake Simcoe burbot which are of comparable quality. In the event that a commercial fishery could be developed, the harvest of burbot should be turned over to private enterprise.

A PROVISIONAL CHECK LIST OF LAKE SIMCOE FISHES

The following annotated list of fishes includes those forms taken during the present study supplemented by several species recorded by Meek (1902) and Rawson (1930). Some 43 fish comprise the list which has possibly omitted several minor species of minnows or other small fish.

THE LAMPREY

Two reports of the capture of lake trout with lampreys attached have been received, both during 1950. A perch captured by an angler in July of 1954 carried an 8-inch lamprey. However, the lampreys were not kept and it has not been established whether they were small sea lamprey, *Petromyzon marinus*, or adults of the parasitic silver lamprey, *Ichthyomyzon unicuspis*, which is native to Southern Ontario. As lamprey scars do not appear on the lake trout or other fishes of Lake Simcoe, the population of lamprey, if any, in the lake is insignificant.

THE LAKE STURGEON, *Acipenser fulvescens*

The lake sturgeon was noted in the early commercial fishing records for Lake Simcoe but apparently has been absent from the lake for many years.

THE LONGNOSE GAR, *Lepisosteus osseus*

The longnose gar, garpike, or gar frequents the weedy bays of Lake Simcoe in low numbers.

THE BOWFIN, *Amia calva*

The bowfin or dogfish is limited in distribution to the warm weedy bays.

THE LAKE WHITEFISH, *Coregonus clupeaformis*

The common whitefish of Lake Simcoe is an abundant but slow-growing fish which has formed a valuable part of the commercial and sport fishery although the average weight of the fish captured is only about one pound. There is a comparatively low population of faster-growing whitefish, known locally as "humpbacks" which resemble the commercial whitefish of the Great Lakes.

THE FRESHWATER HERRING, *Leucichthys artedii*

The freshwater herring, or cisco, is an important species which is known locally as "blueback" or "sand herring" and is an important sport and food fish of Lake Simcoe.

THE "TROUT HERRING"

This fish is distinguished from the "blueback herring" by its small slender form and resembles closely the bloater, *Leucichthys hoyi*, of Lake Ontario in appearance and habits. It is observed often by winter ice fishermen but seldom, if ever, taken by angling.

THE ATLANTIC SALMON, *Salmo salar*

Although the introduction of Atlantic salmon was attempted by a planting in 1871 and there have been three more recent plantings, the establishment of this species in Lake Simcoe waters is questionable. There have been quite reliable reports of the capture of a very few Atlantic salmon but none of these fish have reached the hands of a taxonomist for positive identification.

THE RAINBOW TROUT, *Salmo gairdnerii*

The rainbow trout, or steelhead, was introduced to Lake Simcoe waters through a number of plantings of young fish since 1918 and has increased to a modest population level although it has been of comparatively little value to the sport fishery.

THE BROOK TROUT, *Salvelinus fontinalis*

The brook trout, or speckled trout, is native to the headwaters of several tributary streams of Lake Simcoe and specimens are taken rarely by lake fishermen.

THE LAKE TROUT, *Salvelinus namaycush*

Lake Simcoe has been noted for the excellence of its lake trout fishery since early explorers first visited its shores.

THE COMMON WHITE SUCKER, *Catostomus commersonnii*

The common sucker is abundant in the shallow areas of the lake and spawn in the streams in the spring.

THE LONGNOSE SUCKER, *Catostomus Catostomus*

The longnose or sturgeon sucker is present in the deeper part of the lake.

THE CARP, *Cyprinus carpio*

The population of carp assumed tremendous proportions following its introduction late in the 19th century although it now is present in the shallow parts of the lake in low to moderate numbers.

THE CREEK CHUB, *Semotilus atromaculatus*

The creek chub is found in numbers around the river mouths.

THE FATHEAD MINNOW, *Pimephales promelas*

The fathead minnow was reported in small numbers near Hawkestone by Meek (1902).

THE COMMON SHINER, *Notropis cornutus*

Common shiners are present in moderate numbers in shallow water and around river mouths.

THE LAKE EMERALD SHINER, *Notropis atherinoides*

The lake emerald shiner is abundant in Lake Simcoe waters. It is an important food of other fish and an excellent bait species.

THE SPOTTAIL SHINER, *Notropis hudsonius*

This small minnow is common in Lake Simcoe and sometimes used as bait although fishermen often do not recognize it from the lake shiner.

THE BLACKNOSE DACE, *Rhinichthys atratulus*

The blacknose dace is present in small numbers in several of the river mouths.

THE LONGNOSE DACE, *Rhinichthys cataractae*

The longnose dace was reported to be common at Beaverton and at the Atherley Narrows by Rawson (1930).

THE BLACKNOSE SHINER, *Notropis heterolepis*

The blacknose shiner, or "Muskoka minnow", was taken in comparatively small numbers by Meek (1902) at Hawkestone.

THE REDBELLY DACE, *Chrosomus eos*

Numbers of redbelly dace were taken by Rawson (1930) along the shores of the lake.

THE BLUNTNOSE MINNOW, *Hyborhynchus notatus*

The bluntnose minnow is present in small numbers near several of the rivers of the east shore.

THE FINESCALE DACE, *Pfrille neogaea*

A small number of specimens of this minnow were reported by Rawson (1930) near the Atherley Narrows.

THE SILVERY MINNOW, *Hybognathus nuchalis*

The silver minnow was recorded by Meek (1902) as abundant at Atherley.

THE BROWN BULLHEAD, *Ameiurus nebulosus*

The brown bullhead, or catfish, is common in the muddy and weedy areas of the lake and river mouths.

THE YELLOW BULLHEAD, *Ameiurus natalis*

The yellow bullhead is not usually distinguished from the brown bullhead by most fishermen although it is present in moderate quantities in the river mouths and weedy areas of the lake.

THE CHANNEL CATFISH, *Ictalurus punctatus*

The channel catfish is present in moderate numbers in Lake Simcoe waters.

THE BANDED KILLIFISH, *Fundulus diaphanus*

The banded killifish are present in several weedy bays of the lake.

THE MASKINONGE, *Esox maskinongy*

The maskinonge, "muskie", or "lunge" was formerly an abundant species in Cook's Bay and other weedy areas of Lake Simcoe but has declined steadily in numbers and now is taken seldom by angling.

THE NORTHERN PIKE, *Esox lucius*

The northern pike, although native to Lake Simcoe waters, did not increase to the present high population level until recent years. It now occupies those areas formerly dominated by the maskinonge.

THE TROUT-PERCH, *Percopsis omiscomaycus*

The trout-perch is quite common in the river mouths of the east shore of Lake Simcoe.

THE YELLOW PERCH, *Perca flavescens*

The yellow perch is abundant in Lake Simcoe and provides a good sport fishery.

THE YELLOW PICKEREL, *Stizostedion vitreum*

The yellow pickerel, or walleye, is native to Lake Simcoe and present in considerable numbers. A heavy run of this species into the Talbot River has developed in recent years.

THE LOGPERCH, *Percina caprodes*

The logperch is present along the shores of Lake Simcoe and in the river mouths.

THE IOWA DARTER, *Poeciliichthys exilis*

This small fish frequents the weedy bays and rivers of Lake Simcoe.

THE JOHNNY DARTER, *Boleosoma nigrum*

The Johnny darter has been found near the river mouths of the east shore of Lake Simcoe.

THE LARGEMOUTH BASS, *Micropterus salmoides*

The largemouth bass, or green bass, is native to the weedy bays of Lake Simcoe and is more abundant in the Cook's Bay area while absent over much of the lake.

THE SMALLMOUTH BASS, *Micropterus dolomieu*

The smallmouth bass is widely distributed in Lake Simcoe and is one of the most important sport fishes.

THE PUMPKINSEED, *Lepomis gibbosus*

The pumpkinseed, or common sunfish, is widely distributed near the weedy areas of Lake Simcoe.

THE ROCK BASS, *Ambloplites rupestris*

The rock bass is a common fish of the shoal areas of the lake frequents the smallmouth bass fishing grounds.

THE BROOK STICKLEBACK, *Eucalia inconstans*

The brook stickleback was found to be distributed widely around the shores of Lake Simcoe in small numbers by Rawson (1930).

THE BURBOT, *Lota lota lacustris*

The burbot, or ling, is abundant in Lake Simcoe and is taken accidentally by anglers during the winter fishery.

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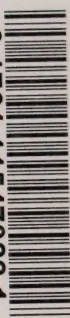
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